NURSING:

ISABEL HAMPTON ROBB.

PLATE I.

NURSES' TOILET-BASKET FOR PATIENTS.

Nursing is an art . . . requiring as hard a preparation, as exclusive a devotion as any painter's or sculptor's work. For what is the having to deal with dead canvas or cold marble compared to the living body, the temple of God's Spirit? It is one of the fine arts, I had almost said the finest of the fine arts.

FLORENCE NIGHTINGALE.

A motive that gives a sublime rhythm to a woman's life, and exalts habit into partnership with the world's highest needs, is not to be had where and how she wills; to know that high initiation, she must often tread where it is hard to tread, and feel the chill air, and watch through darkness. It is not true that love makes all things easy; it makes us choose what is difficult.

GEORGE ELIOT.

NURSING:

ITS PRINCIPLES AND PRACTICE

FOR HOSPITAL AND PRIVATE USE

BY

ISABEL HAMPTON ROBB

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DEDICATED

TO MY PUPILS

OF THE

ILLINOIS TRAINING SCHOOL FOR NURSES

CHICAGO

AND OF

THE JOHNS HOPKINS HOSPITAL

TRAINING SCHOOL

BALTIMORE

Prefatory Note to Third Edition.

IN preparing the third edition the entire material has been gone over carefully and the book enlarged fifty-three pages. The arrangement has been altered somewhat, Chapters II and III having been combined to form Chapter II, and Chapters VIII and IX to form Chapter IV. Two new chapters have been added, and elsewhere new material has been substituted for old. The first chapter has been entirely changed. Instead of the schedule for a two years' course a suggestive outline for the division of work over the three years of instruction, which is made to include a six months' preliminary course, has been given. This preliminary course is so arranged that during this period a definite amount of practical and theoretical work is covered. A class of probationers is made up for the spring and autumn, each class being divided into five sections, (A, B, C, of group I, and D and E of group II) with an equal number of pupils in each section. At the end of a certain number of weeks the sections exchange work, until the entire course, lasting over a period of six months, is covered. Classes, lectures and demonstrations occupy the afternoon hours. It is not intended that the probationer shall do any actual nursing but during the morning hours from 7 to 11, and again from 5 to 7 in the afternoon she is required to perform certain domestic duties in the wards under the observation and criticism of regular instructors, who must be graduate nurses of experience. By this method the

probationers will become practically familiar with all the details of the methods employed in each department, and will be taught their relation to the care of the patient before they are called upon to undertake actual nursing duties. This arrangement at the same time will relieve the nurses of much of the domestic side of their work and thus enable them to devote more time to the actual nursing, with the result that the patients will receive better care.

Prefatory Note to Second Edition.

IN preparing the second edition very little has been changed, but new matter has been added to bring the book up to the latest methods. A suggestive chapter has been added on the division of work over three years of instruction, and courses of lectures have been mapped out to cover this time. Some new figures have been added, of which the majority illustrate the appliances employed in surgical work, which have been tested and found of practical use.

My thanks are due to Dr. J. Whitridge Williams for his criticisms and suggestions on the obstetrical chapter; and to Dr. Booker, of Baltimore, and Dr. Edward Cushing, of Cleveland, for reviewing the chapter on children; also to many of my friends among superintendents of training schools for suggestions and material. The form of marking the pupil nurses' standing was kindly supplied me by the Superintendent of the Lakeside Hospital Training School.

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NURSING:

ITS PRINCIPLES AND PRACTICE

CHAPTER I.

SUGGESTIVE OUTLINE FOR THE THREE YEARS' COURSE.—EXAMINATIONS.—THE PRELIMINARY COURSE.—CLASSES, LECTURES, ETC., FOR (*a*) FIRST YEAR, (SECOND HALF).—(*b*) SECOND YEAR STUDENTS.—(*c*) THIRD YEAR STUDENTS.—REFERENCE LIBRARY.—FORM OF REPORT.

A general outline of the plan that might be followed during a three years' course of instruction is given here. This may be of practical use as an aid to intending students, and at the same time may serve to impress upon them the fact that the work can not be done haphazard, that system and method must prevail throughout, and be cultivated as part of their training. A detailed account of the whole curriculum will be found elsewhere.

A SUGGESTIVE OUTLINE FOR A THREE YEARS' COURSE OF INSTRUCTION.

The course of instruction is to be graded and extend over three years, including the time of probation. Practical work in the ward, demonstrations at the bedside, in the class-room and the laboratory, should be preceded and supplemented by a regular course of lec-

tures and recitations. As far as possible the work of any given year should be a necessary preparation for that of the succeeding one. Lectures and classes should extend throughout the entire first year, but in the second and third years they should be limited to the regular teaching months, from October until May. The pupils are divided into three classes, belonging to the first, second and third year respectively. During the three years' graded instruction, practical and theoretical, is given in the following subjects: bacteriology, hygiene, household and nursing economics including dietetics, anatomy, physiology, materia medica, the principles of nursing and their practical application to the care of medical, surgical, gynæcological and obstetrical patients, as well as in mental and infectious diseases. Special attention is also given to the subjects of surgical technique, massage and the ethics of nursing.

FIRST YEAR.

The first six months of the first year are devoted to a preliminary course for probationers. This course is given to the student before she is allowed to begin her practical nursing in the wards, and embraces the elements of anatomy, physiology, hygiene, bacteriology, household economics including invalid dietary, materia medica, the elements of nursing, and hospital ethics and etiquette for probationers. These subjects are taught by lectures, demonstrations, recitations and by practice.

During the second half of the year classes in the principles of nursing are held, the pupil is taught the practical care, in the wards, of the ordinary medical, surgical and gynæcological patients, and towards the

end she can undertake her first term of night duty. During these months she attends lectures dealing with the various branches of medicine and surgery, the changes that take place in the various systems of the body when invaded by disease, the signs by which they may be recognized, together with the duties of a nurse in regard to them, and the ethics of nursing for first-year nurses.

Lectures.—A systematic course of didactic lectures in connection with the above subjects, is given by specialists in their various branches. Notes upon each lecture are to be taken and written up in full by the student later.

SECOND YEAR.

Practical Work.—A service in the dispensary and in the general surgical operating-rooms; the care of the patient before and after operation; special nursing in the public and private wards; and a term of night duty.

Class-work.—Testing of urine; nursing in medical and surgical diseases; surgical technique; anæsthesia; the care of children; nursing in infectious diseases, and the ethics of nursing. Lectures on the above subjects in connection with the class-work are given by physicians.

THIRD YEAR

Practical Work.—A service in the obstetrical ward, and the care of the nervous and insane. Class-work and lectures upon obstetrics, massage, nursing of the nervous and insane and upon special subjects—nursing in diseases of the eye, ear, throat and skin—and on scientific appliances, as electrical apparatus, the Roentgen Rays, the Finsen light, etc.

During the last six months students who wish to prepare for hospital positions are expected to act as head-nurses in the wards or as night head-nurses, as supervising nurses, as assistants in the superintendent's office, and to hold classes under the observation and criticism of the superintendent. Students who desire to qualify more especially for private practice should be given special advantages in whatever branches they may feel deficient.

Examinations.

Unless the probationer holds a high-school certificate or its equivalent, an examination in English branches of study should precede her acceptation as a pupil. At the end of the preliminary course the probationer should be examined in the subjects taught in that course, namely, bacteriology, hygiene, household economics, dietetics, anatomy and physiology, the elements of nursing and materia medica. At the end of the first year the subjects for examination are: (1) The principles of nursing; (2) Medical nursing; (3) Surgical nursing. At the end of the second year: (1) The examination of urine; (2) Duties of the operating-room nurse with special reference to surgical technique; (3) Gynæcological nursing; (4) The care of sick children; (5) Nursing in infectious diseases. The subjects of the third year examination should include: (1) Nursing in obstetrics; (2) Nursing in nervous diseases and insanity; (3) Special nursing subjects; (4) Private nursing; (5) The ethics of nursing.

TABLE—SHOWING A SCHEME FOR INSTRUCTION EXTENDING OVER THREE YEARS.

Six Months' Preliminary Course of Instruction for Probationers.

(Subjects divided into two main groups.)

GROUP I—HOUSEHOLD ECONOMICS.

A The hospital, and the practical care of its wards, sick-rooms, lavatories, bath-rooms.

B Care of the linen: in the central linen-room; in the ward; in the laundry.

C Dietetics: in the general kitchen; in the diet kitchen; in the ward kitchen.

GROUP II—NURSING ECONOMICS.

A Bacteriology.

B Practical chemistry; hygiene and ventilation; methods of heating.

C Anatomy and physiology.
Classes and demonstrations in practical nursing.

D Materia medica.
Pharmacy.

E The surgical supply room.

F Ethics and hospital etiquette.

General Plan of Practical Work.

The six months to be divided as follows:

GROUP I—HOUSEHOLD ECONOMICS.

A Five weeks.

B Five weeks.

C Six weeks.

GROUP II—NURSING ECONOMICS.

D Five weeks.

E Five weeks.

The practical work to be done in the morning under the instructors. Classes and demonstrations in the afternoons to precede the practical morning work.

Daily Practical Morning Work.

GROUP I

A (1) The wards and sick-rooms; (2) bath-rooms and lavatories.

1*a* Proper airing of room, beds and bedding:
Daily general care of room or ward: windows, window shades, floors, furniture, rugs.

b Cleaning of bed frames.

c The making of beds for convalescent patients.

d Daily dusting and floor brushing; care of fire and fire-place; registers; flowers and plants; daily care of the sun-room; of the patients' library; method of preparing room for weekly cleaning; dusting down walls; cleaning windows and brasses; sweeping floors; cleaning rugs and supervision of maids' work.

2 Bath-rooms:

a Care of walls, floors, tubs, fittings.

b Lavatories:
Care of stationary basins, slop-hoppers, refuse cans, bed-pans, sputum cups, urine glasses, bed rubbers, specimen utensils, etc.

c Closets:
Care in the disinfection of closets and ventilation; cleanliness and order; daily care of dust-cloths; cleaning vessels and housemaid's closets.

Daily Afternoon Class-Work and Demonstrations.

GROUP I—*A*—HOUSEHOLD ECONOMICS.

1 The hospital—location and surroundings; its buildings; general plan; methods of heating.

2 The sick-room—location, size, light, ventilation.

Construction—Composition of walls: wood, plaster, cement, tiles and marble. Furnishings: paint, paper, enamelling, hard cements.

Floors—Materials used: woods, cement, cork, tiles, marble. Finishings: oils, shellac, paint.

3 Furnishings:

Bedsteads—Materials: iron, brass, wood; the frame: weight, height, width; durability; simplicity; springs; place in room.

Mattresses, pillows, and materials for making bed: kinds, quality, weight.

Bed-linen: kind, amount necessary.

Chairs: different kinds, and use.

Floor coverings: rugs, linoleum, matting, carpeting, cork, rubber.

Tables, washstands, bureaus, wardrobes, lounges, screens, blinds, curtains, china.

Ornaments: flowers, plants, pictures.

Care of sick-room: general and special cleaning of walls, floors, windows, furnishings and ornaments, bath-rooms, lavatories, and closets; materials employed.

4 Relative cost of sick-room: its walls, floors, furnishings, bed-linen, and cleaning materials.

5 Personnel—The physicians, nurses, orderlies, maids, and the etiquette in relation to each.

Daily Afternoon Classes and Demonstrations.

B—HOUSEHOLD ECONOMICS.

1 The central linen-room: General plan and subdivisions.

List of materials kept in stock for general use in the wards; amount and cost; method of buying linens and other materials; method of sorting and arranging on shelves; method of counting, and of keeping stock-room books; method of distributing.

2 Standard linen-list for a public ward; standard linen-list for the private ward; the ward linen-book; the system of exchange; mending; the disinfection of linen; removal of stains; the economical use of linen in the wards; the systematic changing of soiled for fresh linen in the wards.

Blankets: kind, quality, weight; cleansing and sterilizing; frequency of changing blankets in the ward; removal of stains; the care of ward linen-room; cleanliness, order and ventilation.

3 The laundry—General plan and equipment; materials used in the laundry and their cost; method of counting soiled ward linen in laundry; method of sorting for mending and counting fresh ward linen; distribution of fresh linen to the wards; the sewing room.

Daily Practical Morning Work.

General care of ward linen-room—counting, sorting, folding and placing fresh linen on shelves; counting and disinfecting soiled ward linen in the laundry disinfecting room; counting and sorting fresh linen in the laundry; the keeping of the ward linen supply book; the listing and care of patients' clothes.

C—Household Economics

Daily Afternoon Class-Work and Demonstrations

1 The general kitchen: plan and general equipment; store-rooms, cold storage room; general diet lists; methods of food distribution.

2 The ward kitchen: furnishings; daily care; weekly care; thc counting of silver and china; the serving of meals and special diets; the prevention of water-bugs; kitchen linen.

3 The invalid diet kitchen: course of talks and demonstrations on foods and food principles; the physiology of the alimentary secretions; the assimilation of food.

Daily Practical Morning Work

1 General care of the ward kitchen and refrigerator; weekly care of the ward kitchen; weekly counting of the silver and china; care of the sinks and dish-towels; the ward kitchen supply book; assisting in the serving of ward patients' meals.

2 Preparation of foods in the diet kitchen; the preparation and serving of trays; the serving of special diets to patients.

OUTLINE OF COURSE IN DIET KITCHEN

1 The kitchen: location, furnishings, care; stoves: kinds, management, fuels; care of refrigerator, cupboards, silver and china, kitchen towels and linen.

2 Composition of the body.

3 Foods: production and manufacture, preservation and adulteration. Bacteriology in relation to food. Foods in general: need, uses, conditions

influencing the amount needed; classification of food-stuffs, with examples; a balanced diet; the complete digestion of a perfect food, such as bread and butter.

4 Food principles:

a Water: use, amount needed by an average man, result of deficiency or total deprivation; test for hard water, and remedy; the effect of hot or cold water in cooking.

b Salts: effect on system; principal salts derived from foods; uses; excess; deprivation; classes.

c Proteids: why so called; need for; classification; sources; characteristics; digestibility.

Special Proteids. (a) Milk: varieties; composition of cows' and human milk; digestibility; the modification of milk for infants and for children in disease; how to make lime-water and barley-water; methods of modifying milk; the preservation of milk; methods of sterilization; pasteurization; infected milk; ptomain poisoning; the predigestion of milk; peptonized; pancreatized; koumiss; junket; wine-whey.

(b) Milk Products. Principles and mechanism of the cream-separator; cream; evaporated cream; skim milk; condensed milk; its objections as food for infants; buttermilk; whey; cheese; kinds; how made; digestibility; oleomargarine; cottolene; tests; experiments.

(c) The preparation of foods in which milk is chiefly or wholly used. Diseases in which milk is indicated as a food. The Walker-Gordon laboratory.

d Eggs: composition; test for freshness; how best kept; digestibility; uses; the best forms and preparation when indicated in disease; experiments.

e Meats: comparative constituents of meats and vegetables; arguments for and against meat diet; uses and abuses; digestibility; difference between old and young animals; length of time for digestion, etc., for beef, lamb, mutton, veal, pork, poultry, fish, oysters.

The different cuts of each and method of preparing for the sick: (1) in solid, and (2) in liquid form. Soups, teas, extracts and jellies. Fish: boning, cooking; the garnishing and serving of meat in its various forms.

5 Carbohydrates: meaning. Principal carbohydrates; uses; digestibility; special carbohydrates.

Sugar: Varieties; sources; uses; tests for cane sugar, glucose, etc.; when to be avoided; saccharine and its uses.

Starch and Cereals: formula for starch; experiments; digestibility; the cooking of starch.

Cereals: wheat and flour; milling processes; gluten and wheat flour.

Flour: yeast plant and bread; starchy vegetables; chief flour mixtures and preparation.

Vegetables: chief vegetable proteids; digestibility; classification; properties; characteristics; best methods of cooking. Fats and oils: why necessary; amount needed. Salads: uses, preparation and serving.

Fruits: composition; classification; uses and properties; digestibility; preparation and serving of the various fruits.

6 Stimulants and beverages: tea, coffee, chocolate; how grown; adulteration; rules for making; effects. Mineral waters: composition, uses, effects. Beverages of other kinds: uses and effects. Alcohol: as a food; as a stimulant; action upon bodily temperature; absorption; elimination; clinical uses. Wines and malt liquors: composition and uses.

7 Desserts: all kinds of gelatine preparations; their nutritive value; fruit, jellies, and puddings; ices and creams.

Food in relation to disease; menus for special diseases and method of preparation, as for diabetes. The proper food for infants, children, and convalescents.

How to set and serve trays; the planning of meals.

Group II—Nursing Economics.

Afternoon Classes, Lectures, Demonstrations, and Laboratory Work.

A — Bacteriology.

History: bacteria; classification and characteristics; infection and its sources; culture media; cultivation, sterilization and disinfection. The relation of bacteriology (1) to the nurse's daily hospital duties; (2) to cleanliness and sanitation; (3) to ward and laundry supplies; (4) to air, water, food; (5) to infectious diseases; (6) to aseptic and antiseptic surgery, surgical fevers, etc. The prevention and limitation of certain diseases.

Microscopical demonstrations and methods of destroying bacteria.

B—Hygiene, Ventilation, Heating.

Afternoon Classes, Lectures, Demonstrations, and Laboratory Work.

1 A course in elementary physics and chemistry in relation to air, ventilation, soil, water, and food. (2) Hygiene in relation to hospitals. (3) Hygiene in relation to the home. (4) Personal hygiene.

2 Hygiene: air: chemistry of, influence of, amount required; changes it undergoes; causes of impurities; detection of impurities; method of testing the quality of air; statistics of cultures from air breathed in the hospital at different hours.

Ventilation: principles, various methods, best methods. Heat: in relation to health; dry and moist; methods of heating (a) institutions; (b) private dwellings; amount of heat required in a sickroom; how to maintain a proper temperature; modes of measuring heat; the ward thermometer. Bacteriology, ventilation and fresh air.

3 Home sanitation: the house; site, soil, surroundings; drainage; sanitary fittings; main waste-water pipe: its care, foreign bodies in; kitchen- and pantry-sinks, laundry-tubs, bath-tubs, and slop-hoppers; soil-pipe system; location of water-closets; dangers, and how detected; garbage and its care.

Bacteriology in relation to the home.

Water: the chemistry of water in relation to health; characteristics of wholesome water; dangers of impure water; organic and inorganic constituents to be found in water; sources of water supply; modes of supply; sources of contamination; method of purifying; analysis of water.

Bacteriology in relation to water.

Climate: effects of altitude, location and soil on health.

4 Personal hygiene: food, sleep, bathing, exercise, recreation, minute care of the body; clothing for infants, adults, old age; protection of the feet; bacteriology in relation to the preservation of health; vaccination.

C—Anatomy and Physiology.

Daily Afternoon Classes and Demonstrations.

1 Embryology: study of cells and tissues: the cell, its properties and functions, kinds, propagation, repair and death; development of the human embryo; outline of the human body.

2 The skeleton: gross, microscopic, and chemical structure; composition of bone, joints, cartilage, and muscle; names of bones and their functions, nutrition, periosteal covering, divisions, and number.

Joints: varieties, divisions, motions, structural formation.

Muscles: varieties, functions, structure, origins and insertions; tendons and fasciæ.

3 Visceral anatomy: anatomy and position of viscera; physiological laws governing the functions of the internal viscera, the circulatory, respiratory, and lymphatic systems; the excretory organs: the generative organs; the nervous system; organs of special sense, and physiological laws governing them; the glandular system; the physiology of the secretions and excretions.

Classes and Demonstrations in Practical Nursing.

1 Training in note-taking and in written and verbal reports. The general care of the hospital ward or private sick-room, comprising: (a) the location, furnishing, and supplies; (b) sanitary method of caring for the ward; sweeping, damp-dusting, brushing, and cleaning beds; care and cleaning of bath-rooms, lavatories, water-closets, drain-pipes, basins, and traps; care of plants and flowers.

Nursing hygiene: ventilation, air; methods of ventilating, flushing, and warming; the thermometer; methods of regulating the temperature; protection of patients from draughts.

Disinfection and disposal of vessels, dust-cloths, brooms, brushes, soiled linen, soiled dressings, excreta, sputa, mouth-sponges, special dishes. The special disinfection of clothing, furniture, wards, or rooms. The use of disinfectant solutions; of deodorizers.

2 Beds: bed-making for ordinary patients, for convalescents, for operation patients, for fractures; the changing of linen; the arrangement of mechanical appliances for the relief of bed patients; lifting and moving; mechanical restraints.

3 Care of patients: treatment; what to observe and report; care of the bed patients; bathing in bed; care of the teeth, mouth, eyes, hair, nails, and back; prevention and treatment of bed-sores; care of delirious patients, of convalescents; care of the dead.

4 Baths: for cleanliness; as therapeutic agents.

5 Enemata: kinds; methods of preparation; mode of administration. Lavage: of intestines, of stomach, of bladder; douches; catheterization.

6 Temperature: pulse; respiration; charting; recording notes.

7 External applications (general and local); dry heat; moist heat.

8 Counter-irritants; the cautery.

9 Medicines: methods of administration; dosage; weights and measures; the metric system; medicine closets; medicine lists.

10 How to observe, report, and record symptoms.

11 Diet: its importance in disease; its classification in disease; methods of administering food; stimulants; feeding in the acute stages of diseases; in convalescence; the diet in special diseases; the serving of food.

D—Materia Medica.

Afternoon Classes and Demonstrations

1 Medicines: the metric system; tables of weights and measures. Drill in fractions and percentages; approximate measures; abbreviations; symbols; various vessels used for administering medicines; their care; labels; stoppers; medicine-bottles: kinds, size, shape, color.

2 The medicine-closet: its arrangement, care; preservation of medicines.

3 The order-book: ordering medicines; the medicine-sheet. Abbreviations for hours of giving medicines. Methods of handling, measuring, and administering medicines; precautions to observe; care of the hypodermic syringe.

4 Organic and inorganic drugs. The classification of drugs. The various preparations of drugs. Drugs acting on the respiratory, circulatory, and excretory systems; their physiological action; incidental effects.

5 Poisons: kinds, doses, symptoms, antidotes, physiological symptoms.

Daily Practical Morning Work.

OUTLINE OF COURSE IN PHARMACY.

Apothecaries' weight and specific gravity; methods of measuring heat; thermometer.

Sterilization; filtration.

Distillation and pharmaceutical stills.

Percolation and its application to the manufacture of tinctures. Solutions, simple and chemical; official aqueous solutions and liquors. Simple solutions; alcoholic solutions or spirits. Gaseous solutions; chemical reactions. Ethereal solutions; collodions. The preparation of antiseptic and disinfectant solutions; uses and precautions. Carbolic acid, bichloride of mercury, boric acid, normal salt solution, Labaraque's solution, chlorinated soda, lime, listerine.

Outline of process used in making tinctures.

Outline of process used in making fluid extracts.

Outline of process used in making syrups.

Outline of process used in making ointments.

Powders, pills, tablets, capsules and medicated wines.

Hospital formulæ for solutions.

The economical use of medicines.

E—The Central Surgical Supply Room.

Afternoon classes, lectures, demonstrations and laboratory work.

1. Bacteriology in its relation to the preparation of surgical dressings and solutions.
2. Surgical supplies, kinds, amount, cost.
3. Surgical cleanliness of hands, dressings, utensils; management of the sterilizers.
4. The names and care of surgical appliances, the making and covering of splints, pads etc., the care of syringes, rubber goods, mending rubber gloves.
5. Bandaging—Materials, uses, preparation, practical application of all kinds.
6. Surgical suits for surgeons, for nurses; shoes.
7. The etherizing rooms, the dressing rooms.

Practical Morning Work.

1. The preparation of dressings, sponges, iodoform gauze, ligatures, salt solution.
2. The packing of sterilizers, and sterilization of dressings and instruments for wards, for operating rooms.
3. The names and care of instruments.
4. The operating rooms—kinds of, general plan of the walls, floor, plumbing, furnishings, linen, care of.

Afternoon Classes.

F. Hospital etiquette and ethics for probationers.

1. Etiquette—The relation of the probationer to other nurses, to physicians, patients, hospital officials, domestics, strangers.

Ethics—The probationer, object in entering school, history of nursing, qualifications, personal hygiene.

FIRST YEAR (Second half).

Lectures, demonstrations, bedside-clinics and quizzes. The instruction to be given from the nursing standpoint.

1. *Medical Nursing.*

Temperature, pulse, respiration—the observation of symptoms.

Bacteriology in relation to the nursing of medical diseases. The blood, counting blood. The etiology of, and nursing in, the common diseases of the circulatory system, of the digestive organs, of the respiratory organs.

Medical emergencies.

Abdominal symptoms.

Hydrotherapy.

2. *Surgical Nursing.*

Bacteriology of the common surgical bacteria; their relation to aseptic and to antiseptic surgery; to surgical fevers and traumatic wounds; sources of infection and methods of invasion; means of prevention.

Surgical pathology; inflammation; process of repair.

Granulation tissue; œdema.

Surgical fevers; erysipelas; septicæmia; pyæmia; tetanus; anthrax; fractures and dislocations, contusions and sprains.

Hæmorrhage and shock.

3. *Instruction and Practice in Physical Culture.*

SECOND YEAR.

1. The Urine.—Elementary analysis (practical laboratory instruction to be given to the class in sections).

Diseases of the urinary system—Catheterization, bacteriology in relation to the urinary organs.

2. Surgical Technique.—Surgical operating-rooms. Care of patients before, during and after operations. Nursing in special surgical and genito-urinary cases. Infant surgery—joint diseases and apparatus. Surgical diseases—tumors, etc.

3. Gynæcology.—Pelvic anatomy—diseases of the organs of generation. Preparation of the patient for operation and after care. Preparation for major gynæcological operations and after care.

4. Anæsthetics and their administration, with practice.

5. Contagious and Infectious Diseases.—Channels of infection. Prevention and limitation. Immunity from disease. Isolation, disinfection, general treatment.

Typhoid fever, malarial fever, tuberculosis, pneumonia, pleurisy, influenza, meningitis, scarlet fever, measles, smallpox and other exanthemata, diphtheria and allied affections, hydrophobia, Asiatic cholera, amœbic dysentery, glanders and other less common infectious diseases.

6. Constitutional Diseases.—Rheumatic affections, arthritis deformans, gout, diabetes, rickets, scurvy, Hodgkin's disease, lymphatism. Simple and exophthalmic goitre, cretinism, myxœdema.

7. Children.—General care of the young child in health and disease. The diet of the young child in health and disease. Bathing, irrigation of the stomach and bowels, etc.; children's diseases, infantile paralysis, chorea, croup, eczema, etc.

8. Massage.—A full course of practical talks, demonstrations and practice.

Third Year.

Obstetrics.

1. Pregnancy: Organs of the body concerned in pregnancy and in parturition: (*a*) The bony canal, the false and true pelvis; (*b*) The soft parts, uterus, vagina and pelvic floor.

2. Impregnation: The ovum and its development. The placenta; the enlargement of the uterus; the hygiene of the pregnant state; diet; care of the bowels; care of the breasts, etc.; the vomiting of pregnancy; the diagnosis of pregnancy; quickening, the fœtal heart-sounds, etc.; table for calculating the probable duration of pregnancy—death of the fœtus *in utero.*

3. Physiology of pregnancy: Condition of the pelvic organs at term; changes in the entire organism; the mature fœtus; forces bringing about and resisting the birth of the child.

4. Natural labor: Preliminary preparations for stages of labor; position of fœtus, etc.; what to do in an emergency; the birth of the placenta and its management; post-partum hæmorrhage; laceration of the perineum.

5. The puerperal state: Cleanliness; articles required; receiving, washing and dressing the child; the immediate care of the child.

6. The management of the puerperal state: Dangers to be avoided; diet.

Infants.

1. Care of Infants; Condition of the child immediately after birth—(1) general appearance; (2) bony framework; (3) internal organs; (4) changes in the circulation; (5) establishment of pulmonary respiration.

2. Infancy: (1) growth and development of infants; (2) physiological peculiarities; (3) tendency to disease; (4) mortality among infants; causes and prevention.

3. Care of Healthy Infants: (1) handling; (2) bathing; (3) clothing; (4) sleep; (5) exercise; (6) the nursery.

4. Infant Feeding: (1) in health; (2) in sickness.

5. Infantile Diseases: Ophthalmia neonatorum, thrush, diarrhœa, convulsions, cholera infantum.

Care of the Nervous and Insane.

Nervous diseases, hysteria, neurasthenia; nervous prostration; effect of the condition of the mind upon the body; nature and causes of insanity; management of special forms of insanity; hysterical insanity; melancholia and mania, hypochondria, eccentricity, dementia, delusional insanity, epilepsy and epileptic insanity.

Diseases of the Skin.

Anatomy and care of the skin.

Nursing in diseases of the skin.

Diseases of the Eye and Ear.

Anatomy of the eye, care in health and disease.

Care of eyes after operations.

Anatomy of the ear; care in health and disease.

DISEASES OF THE THROAT AND NOSE.

Disorders affecting the throat and nose.

Treatment and nursing in diseases of the throat and nose.

A good reference library may be made from the following works: Gray's *Anatomy*; *Human Physiology*, Foster or Hutchinson; *The Human Body*, Martin; *Bacteriology*, *Dust and Its Dangers*, *The Story of the Bacteria*, Prudden; *The Story of Germ Life*, Cohan; *Hygiene of Transmissible Diseases*. Abbott; *Principles and Practice of Medicine*, Osler; *Materia Medica and Therapeutics*, Wood or Hare; *Textbook of General Therapeutics*, Hale White; *Diseases of Children*, Rotch or Holt; Taylor on *Poisons; Practical Examination of Urine*, Tyson; *Nursing and the Care of the Nervous and Insane*, Mills; *Bandaging*, Wharton; *An American Text Book of Surgery*, Keen and White, or Dennis' *System; Aseptic Surgery*, Robb; *Gynæcology*, Kelly or Penrose; *Obstetrical Nursing*, J. W. Williams; *Puerperal Convalescence and Diseases of the Puerperal Period*, Kucher; *Massage and the Swedish Movements*, Palmer: *Drainage and Sewerage of Dwellings*, Gerhard; *Practical Hygiene*, Parks; *Hospital Construction*, Billings; *Dictionary*, Gould; *Notes on Nursing*, Florence Nightingale; *Guide to District Nursing*, Mrs. Dacre Craven (Florence Lees); *Duties of Hospital Sisters*, Eva Luckes.

In time such a library may be increased by the addition of many equally good books, but the above will answer all practical purposes.

In order to fully profit by such a course the student will find that it is a true economy to possess for her own personal use a full set of text-books bearing upon

the various subjects. In addition, she should habituate herself to utilize the opportunities for more extended reading furnished by the reference library. Carefully prepared sets of notes on lectures should also be kept. Nurses will find such notes of much value for future reference since they can thus readily review the essential points of a subject when text-books are not at hand.

Unless system and order in teaching is first established and a proper consideration is given in the proper place to so valuable a group of subjects as are covered in the preliminary course, much of the reason for and the value of the principles and practice will be lost or at best only superficially understood.

In reading any work upon the principles of nursing the student must at once realize that only the groundwork or the underlying laws governing each subject can be presented and that this knowledge must be supplemented by much practical work. In the following pages it has been the aim to present such principles in as clear a light as possible, so that the reason for the practical steps may be the more readily followed, and the student may come to realize that the nursing of the sick from the professional standpoint means the practical application, step by step, of certain principles. Above all, she must understand that only through the practice of sound teaching can she arrive at skillfulness and thoroughness in her work.

FORM OF WEEKLY REPORT OF THE PUPIL NURSE

Date..

Name ....

Ward...................................Class ....

Thoroughness in work ....

Interest displayed ....

Powers of observation ....

Punctuality ....

Neatness ....

General attention and kindness to patients, disposition

....

General deportment and behavior ....

Executive ability ....

Strong points or weak points in character and work, and any marked peculiarity..............................

....

Health..

Improvement (if any) ....

General Remarks: ....

....

....

Head Nurse ....

A monthly report to be given to the nurse may be made up by the superintendent from the above.

Marking on the various subjects taught and on practical work is of course continued throughout the entire time.

CHAPTER II.

Economics of the Hospital Ward, Free and Private.—Construction.—Furnishings.—Hygienic Arrangements.—Ward Supplies.—Ward Work.—Daily Sanitary Care of the Ward, of the Beds and Blankets.—Care of the Ward Utensils.—Personnel.

With the increasing development in the science of medicine, and particularly in the field of bacteriology, and with the conviction, which is becoming recognized more and more, that thoroughly clean surroundings and pure air are absolutely necessary for the recovery of patients, hospital construction, arrangement and equipment have become subjects of serious consideration especially to the medical and to the nursing profession. For this reason it is necessary that a trained nurse should have some practical knowledge of the plans and arrangements of modern hospitals, for there is nothing in or about a ward or sick-room that does not directly or indirectly affect the welfare of the patients. Many of the rules that hold good in hospitals can be applied, with some modifications, to private dwellings. In private nursing the nurse may be the only one in the house who realizes that there may be something wrong with the sanitary arrangements which urgently needs to be corrected. To become familiar with the subject a special course of lectures and demonstrations dealing with hospital construction, heating and ventilation, is first necessary, the knowledge thus acquired being put into daily practice later on in the hospital.

The greater portion of a general hospital is given up to the wards for free, or practically free, patients, but in a great many there are, besides, accommodations for a limited number of private patients. The average free ward ought to contain not more than from twenty-four to thirty beds. The beds should be separated by a distance of at least three feet, and each patient should be allowed about sixteen hundred cubic feet of air space. For a ward of this size there should not be less than one bath-room, one lavatory, two closets and, if possible, one room set apart to contain nothing but the slop-hopper, racks for holding vessels, and shelves for urine jars and catheter bottles. It is desirable to have a separate room for a linen-closet, another for the patients' clothes, one that can be used as the nurses' work room, a small ward kitchen, a dining room and at least two private rooms to be used for extremely ill and delirious or dying patients, so that they may be removed at once from the ward. The effect caused by the death of a patient in the midst of others is, to say the least, not encouraging.

For a surgical ward there should also be a room set apart for changing dressings, putting on plaster casts and other surgical work. This room should contain the ward dressing-table, the various solutions, ointments, bandages, dressings and other appliances. Where such an arrangement is possible, a great deal of time is saved for the surgeons and nurses; the patients are relieved from the sight and sound of much suffering; the ward is more easily kept neat and clean, and there is much less fetching and carrying of appliances. For a medical ward a corresponding room could be employed for examinations and special forms

of treatment, such as lavage, irrigation of the bladder and aspiration. Here also could be kept the various appliances for counting the blood, and for examinations of the various secretions and excretions. The necessary articles of furniture in such a ward are, besides a bedside table and a comfortable armchair between every two beds, three or more wheel-chairs for convalescent patients and two ward tables. If possible, it is best to have a room opening out of the ward which can be used as a ward office and in which the medicine closet may be kept out of sight of the patients. Such an arrangement will also remove the temptation from patients who might be inclined to help themselves to stimulants or poisons. The walls should be hard finished and painted some pretty soft color; usually pale green or buff is chosen. If one room can be set apart as a day room or sitting-room for convalescent patients, it should be fitted up with lounges, a bookcase filled with books, plenty of games, plants and flowers and bright rugs; if such a room cannot be obtained, the books and games must be kept in the ward.

Although it is desirable for hygienic reasons to have as little furniture as possible, and that of the simplest kind, the appearance of a ward can be greatly improved by having potted plants placed in the windows or in groups. They are harmless and are a source of great pleasure to the patients. They need not add much to the ward expense, for the patients or their friends are often glad to contribute a plant to aid in making the room look bright.

The private ward is usually simply a hall or floor divided into a number of rooms communicating with each other bv means of sliding padded doors. In a

hospital, each of these rooms should be a model sick-room, in respect to location, sanitation, access, isolation, and water and toilet conveniences. It should be of ample size, away from noises, have plenty of light and sunshine, and be capable of being thoroughly cleaned. There should be not less than two well fitting windows in such a room, unless the sun has free access to it, when one large one will be sufficient. If there are wards or rooms in use above or below it, special care should be taken that the floor is deadened so as not to convey sounds. The higher up the room is situated, the better it is for fresh air and ventilation. Each ward or private room should have an open fireplace. The walls and ceiling should always be hard-finished and painted, so as to allow of frequent washing; a hardwood or non-absorbent floor is also desirable. In most cases of acute illness it is better to have little or nothing in the shape of pictures, as they are simply dust-collectors. The arrangement of the furniture also requires consideration. The bed should be of the single or three-quarter size, moderately high (the wire mattress being twenty-four inches from the floor) and placed so as to be accessible from three sides, away from the door, and in such a position that the light from the window falls pleasantly upon it. The bedside stand should be on the side next the door, the wardrobe behind the door, the dressing bureau on the side or in a corner where the patient cannot see into the mirror; the washstand on the other side of the room near the bed; two ordinary chairs, a cane or wooden easy chair, a small table, a screen, a thermometer, a lounge and the toilet china complete the furnishings. Everything should be in good taste and as

dainty as possible, but must be of an absolutely simple character; intricate and elaborate carvings and finishings upon hospital furniture are to be condemned. Heavy woolen rugs or carpets, upholstered chairs, pictures and bric-a-brac must not be permitted, though, unfortunately, such furnishings are still not infrequently found in private hospitals and endowed rooms. This surplus not only entails useless expenditure, but is really harmful, and a nurse who understands the value of cleanliness will do all in her power to introduce a hygienic method of furnishing sick-rooms. A simple room such as we have described can be made to look pretty and inviting by the addition of rugs, curtains and chintz coverings for the lounge and easy chair. A bedside mat and one or two other rugs, large enough to give an air of comfort and color to the room, but small enough to be easily taken up, shaken, and cleaned, are all that should be allowed; art rugs answer the purpose well, but when dealing with infectious or contagious diseases even these should be prohibited. Dark green holland blinds are the best for shade; small white curtains of some soft washing material at the windows give an air of finish and cleanliness. All heavy articles of furniture should be on casters, so that they can be quietly and easily moved. Rubber tips should be used for the legs of beds and chairs. In a private house an adjoining room should be set apart in which utensils, medicines and everything disagreeably suggestive can be kept out of sight of the patient. Noises such as the banging of doors, loud talking, the rustling of skirts and aprons, or the creaking of shoes, should not be allowed to disturb the sick-room. A nurse's dress should be free

from starch; her voice should be low, quiet, but distinct. It should never be allowed to be heard beyond a few feet. Sitting in a rocking chair should not be indulged in. Coal can be put on the fire wrapped in paper, and a wooden ash shovel and poker may be used in place of those made of metal. Attention to all such details are aids to the patient's recovery.

The room should receive a very careful cleansing between the departure of one patient and the admission of another. The windows should be opened wide to the fresh air and sunshine; the blankets, mattresses and pillows should be sent to be sterilized and then hung in the sunshine and air; the walls of the room should be brushed, the bed-frame, bureau drawers, wardrobe and other furniture washed with soap and water, and the floor and windows cleaned. Entirely fresh bedding, linen and curtains should be used. Fumigation should be employed after any very unpleasant or infectious disease.

A nurse in training should try from the very beginning of her work to school herself in habits of observation; she may do this best at first by noticing the condition of the ward, whether it is orderly or disorderly, and what she can do to put things to rights. She should never pass up or down a ward without training her eyes to observe the condition of the patients, beds, tables, chairs and window-sills. This may be done by looking on one side on going up, and the other side on coming down. If there is anything out of order which may be righted in a moment, she should not fail to attend to it; and if each nurse were trained to this habit, there would

not be the least necessity for a ward ever to appear out of order. It is also imperative that whatever she uses should be put away in its proper place when the work is finished. If each woman as she enters the training-school would take this one precept to heart, it would save many unnecessary footsteps and much valuable time, not only to herself, but to all those who work with her. But sad to say, one is obliged to emphasize over and over again, to class after class, the importance of returning to their proper places things which have been used. If a sheet or towel or night-dress is needed from the linen-room, it is not necessary to pull down and leave in disorder a whole pile in order to get the one wanted. If a medicine-glass is used, it should be washed and put back in its proper place at once before the nurse goes on to something else. If little details such as these are disregarded, but little time is saved at the moment, the work is increased instead of lessened, and after all at the end there must a general tidying-up time without the satisfaction of always having an orderly ward.

So, then, we repeat that the two habits of *order* and *observation* are most essential points to be cultivated in the beginning of a nurse's training.

In addition to the furniture already mentioned as necessary in a ward, there are various other articles desirable, such as invalid bedside tables, wheel-chairs, extra lounges and rocking chairs, the number of which must depend upon the income of the hospital. One should try, at all events, to have a standard number of each thing, so as to be able to know just what one has on hand and what has to be accounted for; any other plan will lead only to confusion and extrava-

gance. Just here, a word will not be amiss to nurses in general upon care and economy with regard to hospital supplies. With these the nurses have more to do than anyone else; they are the stewards, and upon them lies the responsibility of seeing that nothing is wasted or used extravagantly. For instance, the laundry-work could often be greatly lessened if nurses were more careful when changing beds and using towels; the gas bill could be reduced if they would remember to turn down or put out the gas when it is not needed or when half a flame would do instead of a full one: alcohol, drugs, milk, and food should be ordered only in such amounts as are necessary, and one should be economical, although not parsimonious, in their use. Two bandages should never be put on where one would answer. In all these ways the nurse may become a liberal contributor to charity in that through her efforts two patients can be cared for where otherwise only one could be supported. An accurate knowledge of the value as well as of the amount of the materials in use is therefore necessary.

With a limited number of some articles one can manage very well, but of such things as linen, toilet and dressing basins, and vessels of various kinds, there should be a liberal supply. In the average ward accommodating thirty women the standard linen-list may consist of the following articles:

Blankets (white)	72	Nightingales	12
Blankets (gray)	12	Nightgowns	144
Dresses (women's)	24	Pillow-cases	144
Dusters	12	Pillow-cases (rubber)	6
Napkins (table)	60	Petticoats	18
Napkins (tray)	48	Rubbers (bed)	30

Rubbers (long black) . .	3	Towels (bath)	72
" (dressing, medical ward)	6	" (tea)	12
Rubbers (dressing, surgical ward)	12	" (roller)	12
Stockings, pairs	48	" (dressing) . . .	48
Slippers	24	" (doctors') . . .	24
Spreads	48	" (lavatory) . . .	12
Sheets (large)	144	" (medicine) . . .	12
Sheets (draw)	120	Wash-cloths	40
Table-cloths	6	Wrappers (flannel) . . .	6
Towels (patients' face) .	120	Vests (flannel)	24
		Pillows (feather)	36
		Pillows (hair)	36

With suitable modifications the same list will apply to the male or children's wards.

A general linen-book for all the wards is kept in the central linen-room; in it is entered a list of the linen originally given out to each ward. When a ward is once supplied with its full quota of linen, no new articles should be sent in except by the system of exchange. Thus, for instance, a worn-out garment may be replaced by a new one, but the new one should never be given out until the old one has been returned. Exchanges should be made throughout the hospital on every seventh day or the first of each month, as is most convenient, and during the week or month each nurse should lay aside whatever is worn out or needs mending; on the first of the week or month the superintendent looks these things over, and those condemned are listed and numbered. They are then sent to the central linen-room, the lists are verified, and the defective and worn-out articles are replaced by others. For general ward supplies, such as dishes, soap, matches, brooms or brushes, a requisition should be sent in once a week; a small book is kept in each ward for this purpose, and

every Saturday morning the head nurse writes in it a list of the new articles required, and adds her exchange list of worn-out or broken things. The superintendent, after going over this list carefully to see that economy is being practised, hands it in to the general store-room. Each ward keeps its special basket, which is replenished according to the requisition-book, and returned to the ward on Monday morning. The head nurse receives it herself, sees that what has been sent corresponds with the list in the book, and if the items are correct signs a receipt for them. At the same time on Saturday morning lists of surgical supplies and hospital stationery needed for the week should be handed in to the superintendent.

For the patients' toilet each nurse should be supplied with her own toilet-basket. (See Plate I.) This should be made of strong wicker, thirteen inches long, nine and one-half inches wide, and four and one-half inches deep. The requisite articles are a hair-brush, combs (fine and coarse), small mouth-wash cup, whisk-broom, soap-dish, three small jars for boric acid, oxide of zinc powder and vaseline; three six-ounce bottles, one containing alcohol for rubbing the back and limbs, one ammonia for adding to the bathing water, and one listerine or some pleasant mouth-wash; besides these, there should be a rubber cloth, three-quarters of a yard square, to be used for protecting the pillows, sheets, etc., when a patient is being bathed. Nothing more is necessary, nor should anything else be allowed, as the baskets must be uniform, so that when inspection day arrives the contents of each will be found precisely the same. Each nurse is held responsible for the neatness of her basket. All necessary articles are in it

when it is given her, and after this she must attend to keeping up the supply. Worn-out articles are put on the ward exchange list by the head nurse and their places supplied by new ones, but anything lost must be replaced at the expense of the loser. Nothing in the way of ribbons or binding is needed. The baskets should be arranged in such a manner that they can be kept absolutely clean. Since each nurse is supplied with one, there is no chance for any nurse to complain that she is unable to leave her patients in proper condition because the general ward toilet articles are in use or because some of them cannot be found. The cost in the beginning is considerable, the price of each basket without the contents being about 50 cents; but they wear well and if proper care is taken of them at the end of the three years they can be passed on to the next class. By having a proper number much time and trouble are saved and better work is ensured. In addition each nurse should be provided with dressing scissors, dressing forceps, a probe and a pin-cushion.

The ward basket should contain things for general use in the ward, such as a pin-cushion, sterilized wooden tongue-depressors, a tape-measure, a dressing and dissecting forceps, spatula and an auscultation towel.

The daily care of the ward must come first. The probationer and nurse go on duty promptly at the appointed hour in the morning and begin work at once. These first minutes in the morning are precious, and no one should spend a moment in pausing to chat with the night nurse, who perhaps is a friend, or with her fellow-nurses. The ward discipline in this respect should be very strict. The head nurse is there to over-

see things in general and her own particular work should occupy each nurse at this hour. The probationer begins by giving the side of the ward under her care a general straightening up, unless it is already in order: the chairs are put in their proper places, unnecessary things removed from the stands, and the coverlets all straightened on the beds. This takes but a few moments to accomplish, and gives an orderly appearance at once and makes the remaining work less confused. It is necessary to have the wards neat, quiet and in good order by the time the physician enters to make morning rounds. The hour for rounds varies in different hospitals, but as in many nine o'clock is the time set, for the sake of convenience we will consider this as the hour. The convalescents' beds have been already aired by the night nurse and are ready to be made up at once. The main sweeping and brushing having been finished by the ward maid, the daily ward dusting comes next in order, but it will of course be impossible to have it all thoroughly done for early rounds. This dusting simply removes the twenty-four hours' accumulation of dust. For this purpose a damp cloth wrung out of a basin of a weak solution of carbolic acid should be employed. All the chairs, tables, window-sills, bed-heads, bed-frames, sides and ends should be gone over in this manner, care being taken to change the water frequently. The dust-cloth should afterward be washed out in hot soap and water and wrung out of a 1:20 (5 per cent.) solution of carbolic acid before being hung up to dry. The bedside stands should be examined each day, and nothing left in them but convalescents' clothes; everything in the way of food, extra clothing, pasteboard boxes and other ac-

cumulations should be removed. As there is always a certain amount of dust or fluff under the beds after bed-making, before beginning to dust, the probationer should brush under the beds a second time with a flannel fastened over a broom or a long hair brush. This brushing should be repeated in the afternoon after dinner. Where good nursing prevails a collection of dust is never found under the beds or upon a sick-room floor.

A *ward floor* should be made of hard wood and then rendered impervious to absorption. Scrubbing hospital floors is a mistake, for in this way impurities and germs are constantly being absorbed by the wood instead of being removed; as a result, as soon as the floor dries the dust given off from it may contain the very germs that the washing is intended to remove. Hard wood, finished with shellac varnish, and then treated with a mixture of turpentine and paraffine, makes a beautiful floor, and a perfectly smooth, resisting surface, upon which the dust only rests and from which it can be easily rubbed off. The turpentine is also cleansing, since it dissolves and removes spots or stains; it has also disinfectant and deodorizing properties. To make this preparation:

Take of	Turpentine........	1 gallon
	Paraffine	6 ounces

Allow to stand for twenty-four hours till the paraffine is dissolved, then add one ounce of soft soap before using, mixing all thoroughly.

It can be applied with a pad of flannel fastened on an ordinary mop-stick. With this the floor is to be rubbed all over, and before the hard rubbing for polishing it should be left an hour or so until the turpentine is ab-

sorbed; it is then polished, the rubbing being always in the direction of the grain of the wood, with a heavy polishing brush covered with flannel and weighted with from twelve to twenty-five pounds of lead. This application should be made every week or ten days, the floor being brushed up every day with a hair floor-brush. In brushing a hospital floor it is important to raise as little dust as possible; by fastening a flannel over the brush or broom this danger can be almost entirely obviated. If it were not so expensive, a smooth India rubber tiling or floor covering would be ideal, as it is noiseless and elastic, but not absorbent or slippery.

After the ward is in order the flowers and plants should be cared for, and then the probationer should give her attention to that special part of the ward for which she is responsible; if it be the lavatory, she should see that all bottles, vessels, etc., are clean and in their proper places, that the shelves and slop-hopper are in order and the bed-rubbers cleansed. If the maid does not do her work well, the attention of the nurse in charge should be called to the fact. It is always best to have the criticism come from one in authority, but it is necessary that the matter should be reported, otherwise the probationer may be marked for untidiness in the lavatory or any other department entrusted to her charge.

This daily care keeps the ward in good condition, but it is not sufficient to make a more particular and thorough cleaning unnecessary. When we stop to consider the number of patients with their various diseases who pass through a ward, with, say, an average of thirty inmates daily for six months or a year, besides all their friends and the people who come

and go during that time, we can easily realize how necessary it is to be constantly on the alert with precautionary measures in the way of a ***thorough cleaning***. This should be done daily, weekly, semi-annually and annually. Of the first we have already spoken. In the weekly cleaning the bedside chairs and the window-sills should be washed thoroughly with hot water and green soap, the scrubbing-brush being used vigorously. One day should be set apart for this purpose, each nurse looking after her own division, and on a second day a thorough dusting and cleaning of the beds is undertaken. The bedsteads are washed with a solution of carbolic acid, and the mattresses are well brushed with a whisk broom. This precaution is absolutely necessary in free wards, where vermin are not infrequently brought in by patients or their friends; for if these pests are once allowed to get a foothold, the task of getting clear of them is difficult. A bedbug should never be seen in a hospital ward, and this weekly care of the beds is the only way by which these intruders can be kept out. The same precaution should be taken in private wards, and the patients' trunks should not be allowed to remain in the rooms, but should be unpacked and taken to the trunk-room.

The most thorough cleaning of the ward should be done in the spring, and then, if possible, it is better to transfer the patients temporarily to another ward or to a tent; otherwise we shall have to select a time when the occupants are few. Walls and ceilings should be thoroughly washed down and repainted, all the wood-work well cleaned, windows and chandeliers polished, and the beds disinfected thoroughly with carbolic acid. The floor is scoured at least twice with green soap, hot

water and brush before being paraffined. Every corner and every portion of the ward should receive this treatment.

Besides the regular weekly cleaning that it receives, it should be the rule when a patient is discharged, always to prepare the bed for the next occupant by washing it thoroughly with a solution of carbolic acid. Bichloride should never be used for this purpose, as it corrodes and destroys the iron. The mattresses should be sent to the sterilizing oven, or thoroughly brushed and left for some time exposed to the open air and sunshine. Blankets are treated in the same way. When these are too soiled or for any reason are unfit to be used again without being cleaned, they should be sterilized and put away until a number have accumulated from the various wards, and then all sent at once to be cleaned, instead of being washed at the regular laundry. When frequently washed in the ordinary way blankets become hard and stiff, not to mention the fact that they do not wear well.

The ward utensils, such as the patients' basins, bed-pans, and urinals, besides the attention given them daily, should be well washed out with green soap on a certain day of each week and left in boiling water for an hour. The general bath-tub is to be cleaned thoroughly after each patient. Above all, the ward is not to be made a storehouse for unused or broken articles of furniture, for, unless the rule be rigidly adhered to that only useful articles and those in good repair are allowed in the ward, we are sure to be hampered by an accumulation of rubbish. These are domestic details that must be looked after carefully and systematically, not in a spasmodic way, for they all have indi-

rectly much to do with the patients' welfare. In fact, any woman who lacks either the will or capacity to perform these duties intelligently and thoroughly should not be permitted to undertake the seemingly more serious responsibility involved in the personal care of patients.

The nursing personnel of a hospital ward usually consists of the head nurse, the assistant nurses, the probationers, and in the male ward, an orderly.

If there is an orderly in the ward, his duties should be carefully defined. He will be expected, in the male ward, to give patients their first baths in a tub if they are in a condition to be bathed, and to put them to bed; to carry all vessels to and from the patients; to give enemata to convalescent men; to collect the sputum-cups and keep them clean; to do the ward cleaning in a systematic manner; and to assist in any heavy lifting.

CHAPTER III.

HYGIENE OF THE SICK-ROOM AND WARD.—VENTILATION—TEMPERATURE.—LIGHT.—DISPOSAL OF EXCRETA, SOILED DRESSINGS AND SOILED LINEN.

A real appreciation of the causes of disease and the care of the sick is impossible for anyone who does not possess a good understanding of the laws governing health. Hence it follows that a course in hygiene and its allied branches, bacteriology, practical chemistry, physiology and the elements of physics, should precede the practical nursing of the patients.

No department of a nurse's work should appeal more forcibly to her than the hygiene of the sick-room. She should thoroughly grasp the general principles which underlie the subject, and endeavor to apply them in the minutest detail. Thoroughly clean surroundings and a constant supply of pure, fresh air are the ideal conditions, but the question how these can best be secured may at times tax our ingenuity to its utmost. In well-planned hospitals these desiderata have usually been fully provided for, and it will be the nurse's duty simply to see that the means to this end, in so far as they are entrusted to her care, receive intelligent attention.

Nurses are guilty of culpable inattention who slight this daily and hourly feature of their work. A nurse should constitute herself, as it were, the ward thermometer and barometer, and train her senses to note any change in the ward atmosphere. She should

never come into the room or ward from the outside air without noticing particularly whether any disagreeable odor be present or if the air be heavy and close; and if there be any suggestion of impurity, steps should be taken at once to remove the cause. Even in the absence of the means usually employed she should be able to detect by her own sensations a temperature too high or too low, and air which is damp or chilly. It is just as important to charge each nurse in turn, for a certain length of time, with the responsibility of looking after the ward hygiene as it is to detail her to administer the medicines at the proper hours. Suitable hygienic conditions will sometimes do more to cure patients than the administration of drugs; and fresh air is as necessary as food. The open-air treatment has been given a thorough trial in cases of tuberculosis and many other forms of disease; and the benefits to be derived from it are undoubted. Except in extremely inclement weather a good nurse can keep her patients warm and comfortable even when out of doors, by protecting them well with flannels, blankets, hot-water bottles, and with outside wraps until only the mouth, eyes and nose are visible. Providing these comforts are assured many patients will do far better, if kept in the open air from an early morning hour till sunset, or even during the night as well as the day. Most hospitals now have some sort of a winter garden or sun parlor, so that, when sitting or lying out of doors is impossible, patients can obtain the benefits to be derived from sunshine and light as well as a change of atmosphere.

To render the condition of a ward wholesome, it

is necessary not only to regulate its temperature, but also to provide for the ingress of a supply of fresh air whenever it is needed. Care must be taken that the ventilation flues for removing any accumulation of impure air are opened and closed at the proper hours; that any disagreeable odor is removed; that deodorizers, if they are in use, are renewed; that the waste pipes and kitchen sinks are properly cleaned and flushed daily, that no soiled or infected linen and no soiled clothing or dressings are left standing about in uncovered receptacles, and that all vessels in use are kept thoroughly cleansed. No nurse can do this properly unless she trains herself to be always on the alert to see that no rule of hygiene, which it is possible to observe, is broken; and here, again, much will depend upon the acquisition of the habit of observation.

The limits of a text-book on nursing are necessarily too narrow to permit a full discussion of so important a subject as hygiene. It will be possible only to touch upon the fundamental principles and to describe in brief some of the most important methods.

The first division of the subject to be considered is *ventilation,* but to clearly comprehend its importance one must first understand the conditions that call for it.

Air, being a mixture of colorless gases, is quite invisible, but changes in its composition are readily detected by its exhilarating or depressing effects on the system. As air occurs normally in nature, it consists of 20.63 parts of oxygen, mixed with 78.49 parts of nitrogen. Besides these two substances there is always some water in the form of aqueous vapor, and some carbonic acid gas. The quantity of aqueous vapor varies with the temperature, but on an average

does not amount to more than about 0.84 per cent, and in the open air the proportion of carbonic acid gas (CO_2) is never greater than 4-100 of 1 per cent. Of the two gases of which the atmosphere is fundamentally composed nitrogen is of no biological significance, except in so far as it dilutes the otherwise too energetic oxygen, upon which all members of the animal and vegetable kingdoms depend for the performance of those functions which in their combination we recognize as life. When we remember that air is a mechanical mixture and not a definite chemical compound, we cannot fail to be struck with the constancy of its composition. Normally, carbonic acid gas is being poured out into the air from many sources: men and animals breathe in oxygen and breathe out carbonic acid gas, and in the combustion of wood and coal large quantities of oxygen from the air combine with the burning carbon to form the same substance (carbon dioxide, carbonic acid gas). This production, which might otherwise be excessive, is partially compensated for by the action of plants, since it is well known that trees and plants in their growth split up the carbonic acid gas which they find in the air, retaining the carbon themselves and setting the oxygen free.

It will be readily understood that where anything interferes with the natural methods of purification of the air, as must be the case where people are hived together in cities and manufacturing towns, the proportions above given may be seriously altered by the introduction of impure gases, smoke, dust, and organic matter of various kinds.

Substances containing carbon are present in the

body, and it is through the oxidization of these, with the formation of carbon dioxide (a process of combustion), that the body heat is maintained; hence it is necessary that the air with its contained oxygen should enter the body freely in order that these chemical changes may proceed satisfactorily. The lungs are the organs set apart to render possible the free interchange of the gases of the blood with those of the external air. Each time a breath or inspiration is taken, a certain amount of oxygen enters the lungs; hence it passes through the walls of the capillaries (which ramify over the air-cells of which the lungs are composed) into the blood, by which it is distributed to the tissues. Carbon, burning slowly or quickly, is changed finally, as we know, to carbon dioxide. This finds its escape into the outer air again principally through the lungs, so that with each expiration the air breathed out is charged with a certain amount of impurity in the form of carbonic acid gas. Moreover, certain extremely poisonous organic substances, of the nature of which we are as yet in complete ignorance, accompany the carbon dioxide and add materially to the deleterious effects of the expired air. Unless some provision is made to remove these impurities, instead of breathing in fresh, uncontaminated air, our patient will take in again the same impurities that were breathed out; hence one great necessity for ventilation. Again, organic matter is being constantly given off by the skin, as well as by the lungs, not only in the form of vapor, but also as small particles of waste or decayed tissue. The atmosphere, besides containing these impurities coming from the bodies of men and animals, is in-

fluenced more or less by the different localities and surroundings; thus in some places where there is much decayed vegetation, in swampy or marshy tracts of land, in overcrowded communities, where dirt in dark corners and in vessels is allowed to accumulate, where refuse and offal of every description remain uncovered,—in all such places the oxygen in the air is decreased, and the air itself is contaminated with poisonous gases and compounds, thus rendering it unfit to breathe. The burning of illuminating gas is another factor to be considered, since it deprives the air of its oxygen and gives in return gases unfitted for respiration; thus in the burning of one cubic foot of ordinary gas eight cubic feet of fresh air are used up. The same remarks apply to the combustion processes in stoves and furnaces.

These, then, are some of the conditions which healthy people have to encounter in breathing the air about them; it is obvious that the conditions become much more serious in rooms or in hospitals where disease is continuously present. The quantity of impurities given off from diseased bodies and from the excreta is enormous, so that the matter found in the air of the sick-room and in the dust which collects upon the furniture is likely to contain a large proportion of organic matter, and not seldom the germs of disease.

The necessity for good ventilation and thoroughly clean surroundings thus becomes at once apparent; in a word, the foul air must be replaced by pure, fresh air.

The methods of ventilation may be divided into two great classes, natural and artificial. In each case the

air must be changed without causing a draught. The smaller the space through which the air is admitted the greater danger of having draughts, and the smaller the room, the more quickly and easily does the air become impure. The amount of pure air which should be supplied for each person in an hour is 3000 cubic feet—*i. e.* about 1 cubic foot per second. The volume of a given mass of air varies, like that of all gases, with changes in temperature and pressure; thus gases expand when heated and contract when cooled or when subjected to increased pressure.

Natural ventilation is chiefly dependent upon three factors, the action of the winds, the movements produced by the unequal weight of the different air-strata (brought about by temperature and pressure changes), and the diffusive power of gases. As we said above, heated air expands, and so in a room heated in any way the air must expand more or less according to the degree of heat. The surplus will escape in various ways through doors, windows, and crevices. The outside air, being heavier, will now have a tendency to enter the room and displace the lighter air, but this air which enters becomes heated in its turn, and thus two constant currents of air, one going out, the other coming in, are established. This will occur, of course, only when the temperature of the outside air is different from that of the inside air. These air-currents may at times be so rapid as to produce draughts. If the room has the same temperature as the outside air, there will be no ventilation or change of air. In summer, when windows and doors are all open, the atmosphere is much alike

both inside and out, and for any change that is produced we must depend upon the wind.

But in order to have good ventilation it is necessary that the air which enters should penetrate into every part of the room, and become well mixed with that already there. In the case of winds or air-currents produced by temperature variations, if the velocity be great, the fresh air may enter one portion of the room and pass directly through and out again, thus affecting only the small portion of the air coming directly in its path.

Diffusion of gases goes on perpetually according to the well-known physical law.* The air-currents will be toward that part of the room in which the air is warmest, as they always flow in the direction of the least resistance. No matter into what part of the room the cold air enters, it will always fall. In ventilating by means of windows the entrance of the fresh air and the exit of that which has been exhausted should be regulated by opening the windows from the top only and on opposite sides of the room, one toward the direction from which the wind blows and enters, and the other away from it. In this way any draught that may be caused will be too high up to harm the patients, unless a door should be left open at the same time, so that an opposite current is produced. The patient's bed must be placed out of the line of air-currents. If this is not possible, the patient must be protected from draughts, and possibly a pneumonia, by means of screens, the head of the bed being especially guarded. The old popular idea

*Gases diffuse inversely as the square root of their densities.

that draughts are dangerous is founded on fact no less than is the modern idea that an abundance of fresh air is necessary and helpful. A nurse has been guilty of gross neglect of duty when her patient contracts pneumonia through exposure to too severe currents of air. Another advantage in having the cold air enter at the top is that it will become slightly warmed in its descent, and not be so apt to be felt by those who are up and about the room. When the windows are open, however, care should be taken not to have a patient in bed directly under the one through which the air enters. If there is a fire-place with a fire in it, it will not be necesary for the second window to be opened to let out the heated air, as the draught created by the fire attracts the air to the fireplace and so up the chimney. The fireplace is considered the best method of extracting the air, but this mode of ventilation is suitable only for small wards. Where there is only one window in a room, or where there are two, but both are on the same side, a fireplace is necessary, and in summer a burning lamp or candle should be kept standing in it to warm the air and produce an upward current.

To avoid draughts and to secure a constant supply of pure air in a room, various artifices must be resorted to, some of which are more particularly applicable to private nursing and district work, where a nurse often has to invent her own arrangements and explain away a great many objections. A simple way is to raise the lower sash of a window six inches, and place a board across the opening below; the air will then enter between the two sashes and be directed upward, where it becomes

diffused and no one in the room is subjected to a draught. If the sill of the window is deep, the sash may be raised until its edge is even with the surface of the sill, and in this way the same end is accomplished. In a room with only one window, a pane of glass may be taken out and a piece of tin or paste-board may be so placed that the current will be directed upward. As another expedient, a window can be opened in an adjoining room, which in this way is filled with fresh air, the door into the sick-room being afterwards opened to admit it. The patient may be covered up, head and all, for a few minutes two or three times a day, while all the windows are thrown open and the room is thoroughly flushed. Natural methods of ventilation are those chiefly employed in private houses, and the arrangement of some of the simpler plans very frequently devolves upon the nurse. This is quite right, since she is on the spot at all hours, and should understand just what is required and what is the best thing to do in any particular case. In institutions, however, both natural and artificial methods are used, for no matter what artificial means may be resorted to in the winter for heating and ventilating, in the summer doors and windows are freely opened, and the natural forces are depended on for the distribution of air. Here, on the other hand, it is not necessary for the nurse to plan, so much as to fulfil, and it is her duty to acquaint herself with the exact method employed in the particular hospital in which she works, and to make sure that whatever part of its fulfilment falls to her share is faithfully carried out.

In making our arrangements for ventilation it must

not be forgotten that the preservation of an *even temperature* is all-important. The system by which fresh air can be introduced into the room at almost any degree of temperature desired by passing it over hot-water coils or by admitting it without being heated at all, while at the same time the foul air is removed by ducts, is by far the most complete method employed as yet. The ventilation and temperature of the ward can be regulated by proper observation and with a little care, so that while the room is kept warm enough the absence of impure air or disagreeable odors is remarkable A full description of this plan may be found in Dr. J. S. Billings' description of the Johns Hopkins Hospital.

In order that a correct idea of the temperature may always be obtained, the thermometer should be suspended at a central point in the room or ward and on a level with the eyes, not too near the gas or the windows, and the temperature recorded once every hour. The frequency of such observations will assist a nurse in realizing what variations of temperature may take place within an hour, and should train her in the habit of noting atmospheric changes. A record should be kept faithfully and punctually day and night; and where the temperature is found to be higher or lower than the degree required, the next step after recording it is to remedy the condition by either increasing or decreasing the heat-supply. It would hardly seem necessary to say this were it not a well-known fact that nurse after nurse has been known to pause in her work long enough to look at the thermometer, and, finding the temperature 76° F. or 80° F., has calmly recorded the same and resumed

her interrupted work, without at all realizing that she has performed but the smallest part of her duty. She might just as well, in many cases, omit her patient's medicine as neglect the regulation of the temperature of the air by which he is surrounded. In the same way draughts may blow about some nurses, who, if they have not been especially instructed on this point, will have no idea that the regulation of them has anything to do with their duties. These are minor details, but they are important ones. The ward or room temperature must be regulated according to the nature of the disease, and the comfort of the patient. In fevers it should be of course lower, varying from 55°-60° F., but in bronchial affections it should be kept at about 70° F. The mean should be from 60°-65° F. When the temperature is found to be either above or below this point steps should be taken to raise or lower it. All changes, however, should be made gradually in order to avoid the risk of over-heating or chilling the patients.

Variations in the temperature of the air take place normally at different times in the day, it being warmer at high noon and cooling off towards night. Particular attention should be given to patients in this regard between the hours of one and six in the morning, since at this time the sick, and even well people, often feel chilly sensations. It is during these hours that the vitality is lowest, and many deaths occur. At such times a patient often needs an extra blanket, a hot-water bag or a warm drink; when the extremities are cold they should be rubbed and then wrapped in flannel. Meanwhile, the ward temperature should be kept up, not by closing all windows

and openings and shutting in the foul air, but by the addition of more heat in whatever form it is supplied, whether by means of a fireplace, steam, or hot air. The intelligent nurse sees to it that at any hour of the twenty-four the patient's vitality is so carefully guarded that any tendency to chilliness is promptly met.

Give plenty of light and softly shaded sunshine to patients and ward, but be particular to exclude the glare on hot days, and do not let the sun shine directly upon the face. A southern or southwestern exposure gives the greatest amount of sunshine. Except in certain diseases light is an important factor in the patient's recovery as it renders the air more healthful and has a definitely destructive power upon bacteria. It is surprising how many people, in other respects very intelligent, dread the night air, and how carefully they exclude it from their sleeping-rooms, forgetting that it is the purest air obtainable at that moment, and therefore the best, provided it is not entering directly from some cesspool or contaminated portion of the country. The ideal night light is the shaded electric bulb light. Where this is not obtainable the lamps, candles, or gas should be kept burning in an adjoining room where there is plenty of ventilation.

The disposal of the excreta of a ward or sick-room is one of the most important considerations in connection with its hygienic condition. The sputa and other evacuations, improperly cleaned vessels, soiled dressings, and soiled linen, if not properly taken care of, are prolific sources of impure air.

Sputum-cups for patients should be made of glazed

earthenware, straight up and down, without any corners or cracks, and provided with a simple movable cover when in use. They should be sterilized for one hour in every twenty-four hours.

Bed-pans and urinals should be washed out thoroughly, boiling hot water being allowed to run on them for some little time before they are put away. Soiled dressings should be received in basins with covers or in paper bags, and at once carried from the ward, and, unless special disinfection is necessary, put into the soiled dressing can, which is made of metal and closely covered, and carried away as soon as possible to be destroyed. Vomited matter or evacuations from the bowels or bladder should never be carried through a ward or from a room without being covered over either with a towel or rubber cloth. The rubber cloth is better, as it keeps in the odor; it is also impervious and can be scrubbed and disinfected. If the patient is too ill to use a proper sputum-cup, the expectorated material may be received in a paper handkerchief or a piece of cheese-cloth and placed in a small paper-bag, which, however, should be burned at once. All specimens for examination should be kept in vesels closely protected with clear glass covers, so that the contents are visible, while unpleasant odors cannot escape.

In many hospitals, before it is sent to the general laundry, the soiled and stained linen is washed out and disinfected in the ward stationary basin or slop-hopper. For many reasons such a practice is to be strongly condemned. Where it is followed, the nurses are exposed unnecessarily to risks of infection; time is taken up which should be devoted

to the patients; the infected material passes with the water into the sewer pipes; the procedure is not only unsightly but also produces an unpleasant odor. Moreover, such a method of teaching nurses about the care and sterilization of infected material is too slipshod and hap-hazard. All such soiled articles should be put away by the ward nurses into a receptacle containing enough disinfectant solution to keep them moist. They are then removed from the ward as soon as possible and taken to a room connected with the general laundry, which is fitted up with a ventilating flue, one or two large stationary tubs, or a small washer, and abundantly supplied with disinfectants. Here, under the supervision and instruction of a competent teacher, the probationers should be detailed for duty for a certain length of time, so that they may become thoroughly instructed in the various measures necessary for the proper cleaning and sterilization of stained or infected linen. The object of all these precautions is to reduce to a minimum the scattering broadcast through the hospital of those organic impurities which do so much harm.

Public or municipal hygiene forms an important branch of this subject, especially for nurses who intend to do district or school visiting, or who wish to qualify later as sanitary or tenement inspectors.

But above all it is important that a nurse should have a clear conception of the application of the laws of hygiene to the care of her own personal health. Only too often does the training-school superintendent find, on her tour of inspection of the nurses' sleeping-rooms, that more than one window has been tightly closed all night, notwithstanding the instructions that

have been given. If a nurse can not realize the importance of pure air for herself, how much less is she able to protect the health of those entrusted to her: how little will she be prepared to combat the errors and prejudices which she will daily encounter in her work as a nurse.

The above is, of necessity, an inadequate description of so vitally important a subject, but no pretense is made to do more than endeavor to direct the student's thoughts in the right direction. Any woman will remain superficial if she fail to utilize carefully the lectures and demonstrations on hygiene, and read for herself books that will enable her to have a deeper knowledge of the subject.

CHAPTER IV.

BACTERIOLOGICAL NOTES.—STERILIZATION AND DISINFECTION.—DISINFECTANT SOLUTIONS.—THE METRIC SYSTEM.—THE PREPARATION OF SOLUTIONS.—DISINFECTION OF CLOTHING, ROOMS, FURNITURE, WARDS, EXCRETA, AND VESSELS.—ISOLATION AND QUARANTINE.

The subject of bacteriology as applied to the work of a nurse is too extensive to be fully discussed in one chapter of a book on nursing, and only an attempt will be made to impress the student with the necessity of clearly comprehending how much it depends upon her whether or not the great modern discoveries are utilized in daily life for the prevention of disease. Next to the physician's, the nurse's work is most important in relation to disease, its causation and prevention, for in every department of nursing she comes daily in contact with sickness in some form, and much depends upon the intelligence and care with which she carries out her principles. It is important, therefore, that she should not only be taught carefully the fundamental principles, but also obtain a practical knowledge of the technique, of bacteriology. To accomplish this end a practical course of laboratory instruction which shall clearly demonstrate the essential principles of bacteriology is necessary. Didactic lectures can never take the place of actually assisting in and seeing bacterial development. The beginner cannot do better than read the articles prepared by Dr. T. Mitchell Prudden, for

general reading in his two small books, *The Story of the Bacteria;* and *Dust and Its Dangers;* also the slightly more elaborate volume by Prof. H. W. Conn, *The Story of Germ Life.* These might be read before attending lectures on bacteriology, and will render more interesting the practical demonstrations of the various forms of bacteria, their methods of growth, their uses in the arts, and their relation to the different forms of disease.

Bacteria—so called from the Greek word meaning rods (sing. bacterium, plural bacteria)—micro-organisms, germs, or microbes (*i. e.* tiny forms of life), are among the various terms employed in describing the many and widely different classes of these organisms. It has been found that there are almost innumerable forms and that they are everywhere present—in the air, in water, in vegetable tissues, and consequently in foods. All bacteria are micro-organisms, but not all micro-organisms are bacteria. The bacteria are lowly vegetable forms, while other micro-organisms belong to the animal kingdom. Some of the latter are also of medical interest, as they are the cause of certain diseases in man and other higher animals. Although the majority of the varieties are harmless to man, it is now known that some of the most prevalent diseases, not only those which have been for a long time termed infectious and contagious, but also the so-called blood-poisoning, inflammation, fevers, and abscesses, are caused by certain kinds of bacteria. Every form requires its own peculiar kinds of nourishment and suitable surroundings to enable it to grow and increase. Bacteria are found most often where both heat and moisture are present; putrefaction cannot take place

without them; in the decay of organic material they play an important part, so that we shall not be surprised to learn that the excreta from the body, the sputa, fæces and urine, provide favorable culture-media for various forms. In crowded localities, where uncleanliness prevails, they grow in abundance, while in hospitals they are always present, and constant precautions must be taken to keep in abeyance and, if possible, destroy all virulent forms. Bacteria cling to moist surfaces, and as long as they are in a moist condition they can not be swept into the air nor be carried from one point to another except by animal agents; but when these surfaces are allowed to dry, so that the organisms can be blown about as dust by the winds, then it is that they are carried and scattered abroad and become a source of danger. If they be introduced into wounds, they may cause inflammation or suppuration, or on entering the body may produce blood-poisoning and various forms of infectious fever.

In hospitals or wherever disease is present the means taken to prevent the spread of the micro-organisms must vary according as they are in a moist or dry medium. If the substance which contains them be moist, as sputum or faeces, precautions are taken to see that it be kept so until entirely removed from the ward for disinfection; or the different disinfectants may be used at once, as some of these will destroy germ-life immediately, while others will at least prevent further development and multiplication for the time being. If the germs are dry, as we know they must be in the dust in a ward full of patients, care must be exercised to reduce the amount of dust to a minimum, and to remove it with-

out scattering it. The nurse must, therefore, learn in a very practical way how air, soil, water, food, and clothing are concerned in the spread of bacteria, how the bacteria gain access to the body, and what preventive measures must constantly be employed on account of their relation to health, to disease and to wounds and surgical procedures.

The measures taken to prevent bacterial contamination or accumulation include thorough cleanliness, a free supply of oxygen, destruction of fomites, disinfection, sterilization, and the isolation of infectious cases. Cleanliness in the ordinary sense of the word relating to sick-rooms and hospitals has been discussed in Chapter II, but cleanliness in relation to bacteriology has a much deeper sense; and where there is reason to suspect the presence of infectious germs we should always be sure to keep on the safe side. Thus in all suspicious cases the patient should be isolated and the cleaning done should amount to sterilization in regard to vessels, clothing and excreta.

Sterilization is effected in two ways—either (1) by the action of heat, or (2) by means of chemical agents—but the term "sterilization" is usually employed when heat is used, and "disinfection" where the action of chemicals is relied upon. In addition to heat and chemicals for destroying germs, we depend upon the natural means supplied by sunshine, light, fresh air, especially that of high, dry climates. Within the body the blood, the normal secretions and the use of certain serums are of the greatest importance.

It has been found that while moderate warmth encourages bacterial life a certain degree of heat will effectually destroy it. Bacteria are destroyed by

either dry or moist heat; the latter in the form of steam is the means chiefly used, since a moist atmosphere at 100° C. (steam), or better at 120° C. in a specially designed apparatus, will sterilize much more effectively than dry air heated to a much higher temperature. With our present appliances steam can now be obtained with little difficulty, and if fabrics be not exposed to its influence too long at one time, they are injured less than by dry heat. Dry heat is not so penetrating, and requires a longer time to do its work, not to mention the fact that such things as leather and woollen fabrics, if they be exposed to it long enough to destroy the germs, will generally be rendered completely unfit for further use.

The application of dry heat is a baking process; the objects to be sterilized are exposed to a steady temperature of not less than 300° F. or 150° C. for one hour.

With moist heat the objects to be sterilized are usually exposed to the steam on two or three separate occasions, the length of time necessary for the process depending, *caeteris paribus,* upon the resistance to heat possessed by the organisms to be destroyed. Bacteriologists teach that to entirely destroy all germ-life and all spores, it is necessary to expose whatever is to be sterilized to the steam at 100° C. for three successive days for thirty minutes or more (according to the bulk of the articles) each day, and during the time intervening to keep them in a room at a temperature of 30° C. The rationale of this operation is very simple; the temperature of boiling water (100° C.) suffices to kill all vegetative forms of bacteria, but it often fails to destroy such as are present in the spore

form. In order to accomplish complete sterilization, opportunity is afforded the spores to germinate, which usually happens in one or two days at 30° C. The successive sterilizations are intended to destroy the bacteria as they develop from the spores.

The *autoclave* has been introduced by bacteriologists, and is being generally adopted in hospitals, as by its use a higher moist temperature can be easily procured. In this apparatus the objects are exposed to heat under the pressure of an additional atmosphere and the temperature is raised to 120° C., whereby the need of fractional sterilization is obviated. One exposure suffices to destroy the resistant spores as well as the vegetative bacteria. For smaller articles, instruments, solutions and foods, the Arnold sterilizer (Fig. 10) is most complete and inexpensive. For sterilizing bedding, mattresses, clothing and large articles, a regularly built steam disinfecting apparatus is essential. For public use these should be provided in various parts of large cities, but every hospital should have its own, and each nurse should understand the methods of and arrangements for disinfecting.

Another simple method of sterilizing is to boil the articles in plain water, though usually a chemical substance—as, for instance, 2 per cent. of sodium carbonate—is added to the water. Where no other means are available small articles may be steamed in the ordinary kitchen steamer. Put the articles in the steamer, then closely cover and place over a pot of boiling water. In very virulent forms of disease the destruction of the germs by burning the furniture and clothing is still resorted to.

The chemicals used for the destruction of bacteria

are called *germicides;* those which arrest and prevent development, *disinfectants.* Disinfectants should always be fresh, otherwise they may lose their activity. Some chemicals are simply antiseptic, that is, they retard the growth of the germ but do not destroy it, while others are merely deodorizers—odor destroyers.

With the development of bacteriology and as a result of constant experiment the list of disinfectants or germicides in use is always changing, and what is to-day accepted as the most valuable drug for destroying micro-organisms may in a few months, or even sooner, be replaced by a new one; statements made as to the value of the different chemicals as disinfecting agents cannot as yet be accepted as final.

Corrosive sublimate was for some time considered the most powerful germicide in use, carbolic acid coming next after it; but recent investigations have shown that the action of sublimate is not so effectual as that of carbolic acid. The former, it is true, brings about decided changes in the condition of certain forms of germs, but does not, as was first supposed, always kill them. Besides, the drug is objectionable on account of its intensely irritating and poisonous qualities. Heat in various forms is now relied upon more than chemical preparations for sterilization, but certain solutions are still used for the destruction of germs or as a preventive against their development.

Carbolic Acid ($C_6 H_5 OH$).

One of the most efficient and most frequently employed of the known chemical disinfectants is carbolic acid. It is a product of coal tar distilled at

a high temperature, and when purified comes to us in the form of white crystals readily soluble in water, glycerine, or alcohol. Carbolic acid will not dissolve, however, in all proportions in water, so that aqueous solutions stronger than 5 per cent. cannot be made; at the same time it is a deodorizer, and is sometimes applied locally as an anæsthetic.

Solutions of a strength weaker than 5 per cent. will not destroy all germs, but owing to the irritating qualities of the substance it cannot always be used so strong, and for the skin or mucous membranes weaker solutions are employed. They should be made to come thoroughly in contact with whatever is to be disinfected, and allowed to remain so for some hours. Carbolic acid is the chemical substance most frequently used for disinfecting clothing.

To mix a 5 per cent. or 1:20 solution the bottle containing the crystals is placed in hot water until these are melted; then 1 part of carbolic acid is taken, 19 parts of boiling water are added to it, and the whole is shaken vigorously until all the globules of carbolic acid have been dissolved by the water. If the water be not sufficiently hot or the solution not well shaken, globules of the acid may remain undissolved—a condition full of danger, since one of these will burn any living tissue which it touches. It is a good plan always to glance at the solution before using it, to be certain that none of these globules are present. If cold water is used to make the solution 1 part of glycerine and 1 part of alcohol are added to assist in dissolving the carbolic acid.

Corrosive Sublimate ($HgCl_2$).

Bichloride of mercury is soluble in 16 parts of cold water, and ranks next to carbolic acid as a disinfectant, being used in solutions varying in strength from 1:500 to 1:150,000, but for destroying germs the strength used should not be less than 1:1000. It is a powerful irritant poison, and must be used with great care. The 1:1000 and 1:2000 solutions are most often employed. Where it is employed for washing out any of the cavities of the body weaker solutions are used (1:5000 to 1:10,000). It is now but rarely employed for this purpose, as the drug is readily absorbed, and has frequently been known to produce symptoms of poisoning. These symptoms are quite definite, and should be carefully watched for by the nurse. As a disinfectant for clothing it is objectionable, because it stains white materials yellow, nor can it be used to disinfect instruments or anything made of metal, as it corrodes them.

To make a 1:1,000 solution 1 gramme (about 15½ grs.) of the powder is dissolved in 1 litre (about 2 pints) of water; weaker solutions can be prepared from this. Any solution requires to be made fresh frequently, as it decomposes and loses its disinfectant qualities if allowed to stand a long time. An equal amount of common salt added to the bichloride will hasten its solution and prevent decomposition.

Milk of Lime.

Milk of lime is considered especially valuable to render innocuous the evacuations from the bowels, but it should be freshly made, otherwise it is useless. Equal parts should be thoroughly stirred up with the

contents of the bed-pan, which must then be allowed to stand for not less than an hour. This is the best method of disinfecting typhoid stools. The milk of lime is made by adding 1 part of slaked lime to 4 parts of water.

Chloride of Lime.

Chloride of lime (chlorinated lime) is perhaps a better disinfectant than milk of lime, but it is not always reliable, as it may be stale, and is objectionable owing to its disagreeable odor. In fact the so-called "hospital odor" can be directly traced to a free use of this disinfectant. From this substance in the presence of air and moisture is set free nascent chlorine, a most powerful reducing agent and highly inimical to living organisms.

Boric Acid.

This drug is classed among disinfectants. It is true that its disinfectant properties are not very marked, but it possesses the additional advantage of being non-irritating. It is used in the 5 per cent. or saturated solution and in solutions of weaker strength for its cleansing effects in the washing out of cavities, for superficial wounds, or for irrigating the bladder. The saturated solution is made by adding 1 part by weight of the acid to 19 parts of water. In making the solution it is much better to use the drug in the crystallized rather than in the powdered form. Boric acid crystals are very light, the measured quantity being short of the required quantity by weight. A saturated solution is best made by putting an excess of the crystals in a filter and pouring the quantity of boiling water

over them slowly until dissolved. The excess crystals are precipitated when the solution cools.

FORMALDEHYDE.

Formalin, the commercial name for a forty per cent. solution of formaldehyde gas, is a very useful disinfectant for clothing, rooms, instruments, and various articles. It is applied most conveniently in the form of gas which is liberated from tablets containing it (paraform), which are exposed to the action of heat obtained from specially constructed lamps. In this way it is applicable to the disinfection of empty sick-rooms and other closed chambers. Its irritating properties make it necessary to employ it only after the sick have been removed; the room is sealed and exposed to the vapor for 24 hours; it must then be well aired before reoccupation. Ammonia water sprinkled about the room will remove the disagreeable odor. In the form of a solution (1 to 5 per cent.) formalin may be applied directly to many infected objects.

Formaldehyde gas, when properly used, is now generally considered very efficient when steam cannot be employed. It also has the further advantage that it does not injure the objects to be sterilized. Its penetrating properties, however, are still questioned.

PERMANGANATE OF POTASSIUM AND OXALIC ACID.

These are used in conjunction in freshly made saturated solutions to prepare the hands before operation and in some cases in the final preparation of the skin of operation patients. The exact germicidal value of these substances has not yet been definitely determined,

and we must await the results of further bacteriological investigations before saying more about them.

Absolute Alcohol.

This is used for cleansing and disinfecting the skin previous to operation and for preserving catgut and other ligatures. It has but little germicidal power.

There are a number of other preparations in use, such as creolin, pyoktanin, salicylic acid, peroxide of hydrogen and lysol, but their comparative merits as disinfectants have not been fully established, and it is unnecessary to enter into detailed descriptions as to their preparation or application.

Normal Salt Solution.

Normal salt solution, so called because it is approximately of the same density as the blood-serum, contains $\frac{6}{10}$ of 1 per cent. of sodium chloride. It is prepared according to the following formula:

℞ Sodium chloride, 6 grammes (circa ʒiss);
Distilled water, 1,000 cc. (circa Oij).

This is about equivalent to one teaspoonful of table salt to a pint of water.

Mix thoroughly with a glass rod, and filter through filter-paper into a sterilized flask or bottle of a capacity of about two liters; stopper the bottle with sterilized common cotton, keeping the plug in place with a few turns of gauze bandage, which also prevents any accumulation of dust upon the lips of the bottle. The flask is then heated over a gas flame and the solution allowed to boil, after which it is placed in the sterilizer to be steamed for half an hour. This pro-

cess is repeated three times at intervals of twenty-four hours, the solution in the meantime being kept in a room at a temperature of about 30° C. The solution is sterilized in this way because it has been found by experiment that after the first sterilization the spores are not destroyed; the intervening twenty-four hours allow for the development of any spores which may have been present, so that they can be destroyed by the second sterilization; the steaming on the third day kills any which may possibly still remain and the solution is thus rendered completely sterile. Before the operation it is reheated and used at whatever temperature is desired.

Besides being employed for subcutaneous injections, salt solution is used surgically for irrigation or for sponging exposed tissues, to keep ready for use rubber tissues, which are to be employed for covering skin-grafts and to wash out the abdominal cavity after abdominal operations. Besides its cleansing properties, it has been proved to act as a stimulant to the tissues and the red corpuscles are preserved in it, whereas they are destroyed by water. Sterile salt solution should always be kept in stock ready for immediate use in emergencies. All solutions kept on hand constantly must be changed frequently.

Distilled Water.

Distilled water, when used in large quantities, can be most readily obtained from a boiler room, as it is easily made by turning on the steam in the boiler and allowing it to condense. It is frequently used now instead of disinfectant solutions for covering instruments,

for sponging, and, instead of boiled plain water, for preparing salt solution.

The principal point to remember in disinfecting with solutions is that the disinfectant must come in contact with or be diffused through the substance for a prescribed length of time in order that it may be effectual in destroying the bacteria; a mere washing with the solution or pouring it over the object will be of no use.

THE METRIC SYSTEM.

The adoption of the metric system as the standard method of weight and measure is the natural result of the influence of foreign scientific education. In Europe, except perhaps in England, it is universally used, chiefly on account of the greater convenience which it affords. It is being more and more employed by the public, and is now exclusively used in the exact sciences. As many modern hospitals and physicians employ the metric system constantly, it is absolutely necessary that the nurse become familiar with it.

The standard taken first was the meter (39.39 inches)—a standard which can be recovered at any time should the present rule be lost, since it approximately represents the ten-millionth part of a quadrant of the earth's meridian. All the other terms in the system are derived in some way from the meter, which is taken as the unit.

Any subdivision of the meter is expressed by a Latin prefix; on the other hand, when it is increased or multiplied, Greek prefixes are used. The former are deci- (from decem, ten), centi- (from centum, a hun-

dred), and milli- (from mille, a thousand); the latter are deca- (from deka, ten), hecto- (from hekaton, one hundred), and kilo- (from chilioi or chilia, a thousand).

The two arrangements, then, would be as follows:

Decreasing.

Meter.	
decimeter	=one-tenth, .1, or 1-10 of a meter.
centimeter	=one-hundredth, .01, or 1-100 of a meter.
millimeter	=one-thousandth, .001, or 1-1000 of a meter

Increasing.

Meter.	
dekameter	=ten meters.
hectometer	=hundred meters.
kilometer	=thousand meters.

Thus, one decimeter, ten centimeters, or one hundred millimeters are equivalent expressions. The cube of a centimeter is called a cubic centimeter, and is written 1 cc.

The standard of capacity is based upon the standard of length, and is represented by the liter, which is equal to 1,000 cc. The weight of 1 cc. of distilled water at 4° C. is called 1 gramme, and in this way we get the unit of weight.

Thus we have the meter as the unit of length, the gramme as the unit of weight, the liter as the unit of capacity; and the same prefixes as were used for the meter denote their division or multiplication.

In the case of the liter the divisions are rarely spoken of as deciliter, centiliter, or milliliter, but for convenience the cubic centimeter, the equivalent of the milliter, is used entirely; *e.g.*, we say 100 cc. instead of a deciliter, or 10 cc. rather than 1 centiliter, or 1 cc. rather than 1 milliliter.

The relation of the metric system to the weights and measures of the tables in common use are as follows:

1 meter	=	39.39 inches.
25 millimeters	=	1 inch.
1 liter	=	33.81 fluid ounces, or about 2 pints.
29.37 cc.	=	1 fluid ounce.
4 cc.	=	1 fluid drachm, or 5 cc. = 1 teaspoonful.
1 cc.	=	15 minims, approximately.
1 gramme	=	15½ grains, approximately.
1 grain	=	.065 of a gramme.

The term micro-millimeter is used in measuring microscopical distances, and means $\frac{1}{10}$ of a millimeter; it is indicated by the Greek letter μ; thus a red blood-corpuscle is said to be from 6 to 9 μ in diameter.

THE PREPARATION OF SOLUTIONS.

In the preparation of solutions the greater convenience of the metric system over the old system will be made at once obvious by giving a few illustrations, since with it the use of vulgar fractions is entirely done away with.

Solutions of carbolic acid and corrosive sublimate are the ones ordinarily used in hospitals, and for the sake of convenience strong standard solutions are always kept in stock, and weaker ones made from these, when required for use, by diluting with the necessary amount of water. It will be found very useful to adopt as a standard strong solution of each of these, one which contains in 20 parts 1 part by weight of the drug. We speak of these as "1:20 solutions." The weaker solutions are made most easily by simple dilution, although of course, if one wishes, they can be

prepared by dissolving the antiseptic substance in water in the desired proportion.

When using solutions of standard strength (1:20) it is important to remember that 20 cc. of the solution correspond to 1 gramme of the antiseptic substance. We said above that 1 gramme was the name given to the weight of 1 cc. of water. Thus, to make a solution of the strength of 1:1000 we must have 1 gramme of the chemical in 1000 cc. or 1 litre of the finished solution; this is readily obtained by mixing 20 cc. of our standard solution with 980 cc. of water. The whole liter thus contains 20 cc. of the standard solution, *i.e.*, 1 gramme of the original substance in 1000 cc., and the solution is thus rightly named "1:1000."

For making bichloride solutions the metric system is almost exclusively used. Remembering that one liter equals 1000 cc., and taking a 1:20 solution as the basis for making the weaker one, we take

20	cc.	and	add	water	to	make	1	liter	of a	1:1000	solution
10	"	"	"	"	"	"	"	"	"	1:2000	"
5	"	"	"	"	"	"	"	"	"	1:4000	"
4	"	"	"	"	"	"	"	"	"	1:5000	"
2	"	"	"	"	"	"	"	"	"	1:10,000	"
1	"	"	"	"	"	"	"	"	"	1:20,000	"

To make more dilute solutions than these it is more convenient to start with a 1:1000 solution and dilute this. For instance, to prepare 1 liter for irrigation of the strength of 1:100,000 one has simply to dilute the 1:1000 solution 100 times; thus, 100 cc. of the new solution must contain 1 cc. of the 1:1000 solution; 1000 cc. (1 liter) would therefore require 10 cc. of the 1:1000 solution; so by taking 10 cc. of the 1:1000 solution and adding enough water to it to make up a

liter, the new solution is made. To make a solution of the strength of 1:150,000 we must have 1 cc. of the 1:1000 solution in 150 cc. of the new solution. Now, 150 cc. is contained 6.6 times in 1000 cc., so that for 1 liter of the new solution we must have 6.6 cc. of the 1:1000 solution. Similarly, solutions of any strength can be made.

The old method of using apothecaries' weight still prevails in making up the various strengths of some solutions, particularly those of carbolic acid. To make a 1:20 solution of carbolic acid one has only to add 1 part of the acid to 19 parts of water; as a rule, however, not less than a quart is made at one time.

Thus, let it be required to make 1 quart of a 1:20 solution of carbolic acid. Now, 1 liquid quart = 32 ounces. If in 20 ounces of the solution 1 ounce of carbolic acid is contained, then in 1 ounce or part of the solution there will be only $\frac{1}{20}$ of an ounce of acid, and in 1 quart or 32 ounces of the solution there must be 32 times $\frac{1}{20}$ of an ounce—*i.e.*, $32 \times \frac{1}{20} = \frac{32}{20} =$ 1.6 ounces, or 1 ounce and $4\frac{4}{5}$ drachms. Then, taking this amount of acid, sufficient water is added to make the whole up to 32 ounces or 1 quart, and the required solution is obtained.

The weaker solutions are usually made in strengths of 1:30, 1:40, 1:50, 1:60, 1:80, 1:100, and of course to make up any of these strengths from the pure carbolic acid one proceeds in a precisely similar manner.

For instance, to know how much pure carbolic is needed to make any amount of a 1:40 solution, one calculates the amount of acid that is equal to one-fortieth of the whole solution.

Example: Let it be required to make a quart of 1:40

solution of carbolic acid. Now, 1 quart = 32 ounces. The amount of acid required is of course $\frac{1}{40}$ of 32 ounces = $\frac{32}{40}$ or $\frac{4}{5}$ of an ounce of carbolic acid—*i.e.* a little less than 6½ drachms.

We so frequently hear the term "per cent." in connection with the different solutions that to avoid all possibility of error we will discuss its meaning in detail. The term is best explained by an example. Thus, by a 3 per cent. solution of carbolic acid we mean one of which 100 parts contain 3 parts of the acid. Thus, if we have a mixture containing 3 minims of carbolic acid and 97 minims of water, we have a 3 per cent. aqueous solution of carbolic acid. A 1:20 solution of carbolic acid (1 part carbolic acid in every 20 parts of the solution) will be a five per cent. solution. For,

In 20 parts of solution we have 1 part carbolic acid.
In 1 part of solution we have 1-20 part carbolic acid.
In 100 parts of solution we have 100 times 1-20 (=5) parts carbolic acid).
So that a 1:20 solution is a 5 per cent. solution.

Similarly one can reckon the percentage in any other solution; for instance, in a 1:40 solution.

40 parts contain 1 part of carbolic acid.
1 part contains 1-40 part of carbolic acid.
100 parts contains 100 x 1-40 (=21|2) parts carbolic acid.
So that a 1:40 solution is a 2½ per cent. solution.

Since the weight of a given volume of carbolic acid differs but slightly from that of the same volume of water, these solutions may be made up with sufficient accuracy by measurement instead of weight.

BORIC ACID SOLUTION.

For a saturated solution use crystals ℥v to water Oi.

POTASSIUM PERMANGANATE SOLUTION.

For a saturated solution (1:16) use crystals ℥i to water Oj.

For a 1% solution take of the saturated solution ℥iiss to water Oj.

Care and Disinfection of an Infected Room.—In a hospital there should of course be no superfluous furniture or articles to remove at the beginning of the disease, but if in private rooms there are such, they are to be taken out at once: carpets, upholstered furniture, hangings and bric-a-brac, or any personal clothing, the color of which may be destroyed by the action of steam, must not be allowed to remain. Such a room should be in as isolated a portion of the house as possible and correspond in the main to the sick-room already described. The daily care of such a room consists in wiping off the furniture with a damp cloth and sweeping the floor with a broom covered with a damp cloth wrung out of a 1:20 carbolic acid solution; besides this the floor must be rubbed thoroughly with a damp cloth every second or third day. If the disease be contagious, further precautions may be taken by hanging up a damp sheet, kept moist, in the line of air currents. All cloths that are used daily should be washed in hot soapsuds and, when not in use, left to soak in a 1:20 carbolic-acid solution. After the patient has recovered from an infectious disease he should receive a hot soap-and-water tub or sponge bath (including a thorough washing of the hair and irrigation of the ears) followed by a thorough sponging with carbolic-acid or bichloride solution. The finger-nails and toe-nails are cut close and cleansed underneath. A nasal douche is given and the mouth washed out with listerine or a saturated solution of boric acid,

after which the patient is wrapped in clean sheets or clothes and taken to another room. The next thing to do is to remove the clothing and bedding for sterilization. Then begins the disinfection of the room. The mattress is brushed off, wrapped in a damp sheet wrung out of a 20 per cent. solution of carbolic acid, and sent to the sterilizer. The clothes are steamed and then sent to the laundry. Where there is no sterilizer, the bedding must be soaked in a 1:20 solution of carbolic acid and afterward boiled and the mattresses ripped apart and boiled or else burned.

The care of the infected room should then be as follows: All articles are to be left in the room and arranged so as to expose all or the greater part of them to the fumigating substance. To disinfect with formalin close the room tightly, sealing all cracks and openings with paste and paper. Place an alcohol lamp in a metal dish in the center of the room. Put in a receptacle over the lamp three fluid ounces of a 40 per cent. solution of formaldehyde, moisten the air of the room, light the lamp and then close the room up tightly and leave it for twenty-four hours, until the dust has settled; then enter very gently so as not to disturb the dust and wipe off everything in the room with a cloth wrung out of 1:1000 bichloride solution. Treat all the woodwork, floors, furniture, and the bed-frame in this way, and use for the crevices about the bed-frame pure carbolic acid, applying it with a small brush. Wash down the walls with bichloride solution 1:1000, and then leave the windows wide open, so that the sunshine and air may enter freely. In place of the solution, two formaldehyde candles may be used.

Where steam can be secured an excellent method,

whether formalin is used or not, is to fill the room with live steam, keeping up the supply till the moisture stands on the walls or floor; nearly all the bacteria will be on the moist surfaces, and the walls and floor should be washed off with a disinfectant solution before they are allowed to dry. The old method of fumigating with sulphur has been proven to be quite inadequate, as the fumes exercise little if any destructive power on bacteria. If, however, sulphur is ordered, employ the same precautions and then light two sulphur candles. Or use the substance in bulk, 3 pounds to 1000 cubic feet, break in pieces and place in an earthen dish set in a pan. Moisten the sulphur with alcohol, light and allow it to burn from six to eight hours, keeping the room tightly closed.

Vomited matter, evacuations from the bowels in typhoid fever, dysentery and cholera, should be received in a vessel, containing carbolic solution or milk of lime, which should be closely covered before being carried from the patient's bed through the room or ward. Four times the amount of the milk of lime is then added, the whole being thoroughly stirred together; the vessel is then covered and allowed to stand for an hour.

In hospitals where there are many typhoid patients and no conveniences for treating the stools with the lime for that length of time, they should at least be mixed with lime, and when they are emptied down the hopper a good stream of very hot water should be allowed to run into the vessel and down the pipes. This procedure is at best a poor substitute and one that should be used only under the stress of special circumstances. In the country, where these conveniences are

still less frequently found, the stools may be mixed with bran or sawdust and burned.

In regard to the sputum of patients several points must be carefully considered, viz., the receptacle in which it is deposited, the manner in which it is kept, and the final disposition of it. Especial precautions should be observed with the sputum from tuberculous lungs, the organism that causes this disease being very virulent and infectious and retaining its infective properties for a long time. Direct contact with tuberculous sputum is one of the greatest sources of infection; besides, if the expectorated material be allowed to dry and become scattered broadcast, the bacilli may be absorbed with the inspired air into the lungs, and lie quiescent for months until favorable conditions develop, under which the germs can multiply and reproduce the dread disease. Therefore, every precaution should be taken to destroy the bacilli contained in the expectorated matter. The sputum cups used for such patients should be either of china or paper, so that they may be boiled or burned, and made simply, with no crevices in which particles of sputum can lodge. The cup should be kept covered and the sputum moist, so that none of it, becoming dry, may escape into the air of the room. The vessel should be frequently cleansed, and before the contents are thrown away the germs should be destroyed by boiling the sputum in a 2 per cent. solution of carbonate of soda for one hour, or by exposing it to heat in a steam sterilizer for at least as long. An autoclave placed in the ward lavatory for the disinfection of stools, sputum and other excretions in a few seconds is now recommended. This, or a vessel in which the material can be boiled, is very neces-

sary. The paper cups with their contents should be burned.

In infectious diseases all discharges from the nose, mouth, bowels and bladder should be received in a china vessel containing carbolic-acid or milk of lime. In diphtheria the expectoration, nasal discharges and vomited matter should be received in paper napkins, and burned at once in the room or boiled before being taken from it. In scarlet fever, whooping-cough and measles the discharges from the throat and nose should be treated in the same manner.

Two sets of cups should be kept, and boiled in the soda solution each time before being used again. All vessels, tubes or cups that are used for the mouth in diphtheria, syphilis or cancer should be kept in a 1:40 carbolic acid solution and boiled before being used by another patient. Bed-pans used in cases of cancer, in dysentery, typhoid fever, or other infectious diseases, are to be soaked in a 1:20 carbolic acid solution, and boiled before again coming into general use. Sheets and clothing stained with typhoid or dysenteric discharges must be washed out at once, or soaked in a disinfectant solution and steamed before being sent to the laundry. The bedding and clothing from any case of infectious or malignant disease should always be put to soak at once in a 1:20 carbolic acid solution, or else steamed or boiled before being brought again into general use.

Strict precautions are needed for the urine in certain infectious diseases. In typhoid fever, for instance, the urine is frequently contaminated with the specific bacilli of the disease. It is therefore necessary to disinfect this secretion, which can be done by adding milk of

lime or carbolic acid in the proper proportions. The urine may contain other virulent bacteria, as in blood poisoning and in cases of disease of the genito-urinary organs.

The act of coughing in diphtheria, pulmonary tuberculosis, scarlet fever, etc., liberates infectious germs. These may be received on the person of the attendant, on the bedding or furniture, or remain temporarily suspended in the air. We are not yet fully informed of all the ways in which virulent germs are thrown off by the body, but besides those already mentioned there is reason to believe that they may appear in the sweat and in the secretion of the lactating breast in the female. Too great attention cannot be given to disposing of all the secretions and excretions of persons suffering from infectious disorders.

Isolation and quarantine.—In order to prevent the spreading of disease or an epidemic, where a person has been exposed to a virulent contagious disease, such as small-pox, typhus, or scarlet fever, or where one develops symptoms that would indicate the onset of such a contagious disease, steps should at once be taken to ensure *isolation* until the symptoms either develop or the individual is perfectly well after the time necessary for incubation has passed. Where such a disease has developed not only the person infected but all others exposed should be placed in *quarantine*, the entire house and its occupants isolated, and no personal communication allowed with people outside during the progress of the disease. With many infectious diseases, however, it is possible to so completely isolate the patient and attendants that the rest of the family

are not exposed. In the carrying out of such details much depends upon the nurse.

A full description of the methods of disinfection to be employed under different circumstances will be found in Dr. G. H. F. Nuttall's manual entitled "Hygienic Measures in Relation to Infectious Diseases," to which the student is referred.

CHAPTER V.

Beds.—Bed-Making for Bed Patients; for Convalescents.—To Prepare a Bed for an Operation Patient.—Fracture Beds.—Mechanical Appliances for the Relief of Bed Patients.—Lifting and Moving.

The regulation bedstead for hospital purposes has a metal frame, iron or brass being usually employed for this purpose. In private houses wooden bedsteads are still often found, but they are apt to be cumbersome and are not so easy to keep clean. Nor can they be so readily and thoroughly sterilized. Any family would do well to have an iron bedstead on hand, and in any case where there is to be a prolonged illness in the house one should be purchased. Ten or twelve dollars will cover the expense. There are many varieties of the iron-frame bed, and just what selection is the most desirable is often puzzling to a buyer who has not had the actual experience of testing the merits or imperfections of the different kinds. A nurse who works over them daily ought to be a fair judge of what is required in the way of a bed for the sick. Four things should be taken into consideration in making a choice: viz., height, weight, durability, and simplicity. The height must be greater than that necessary for ordinary beds, not only because the continuous bending over a low bed could not be endured by nurses for any length of time, but because for purposes of examination and treatment the doctors must have a bed which will not necessitate much stooping. To the

patient this point is really immaterial, for a footstool can be easily supplied for stepping into or out of bed, or if a patient thinks that he is more comfortable when sitting on the side of the bed, a lounge may be placed alongside for the feet to rest upon. A single bed for a ward and a three-quarter bed for a private room will answer every purpose. It is rare for even the largest person to find them uncomfortable, and too wide a bed would make it impossible for the nurse to do her work with any comfort either to herself or to her patient.

The bed should be of medium weight. Great, heavy, clumsy iron beds are out of place, as it is impossible to move them without extra help and they are apt to become wrenched during the process, and besides are not likely to last any longer than lighter ones. An iron frame should last for years without need of repairs, if well put together and provided with a firm double woven-wire mattress. It should be made with the utmost simplicity, for the sake of cleanliness, and should have absolutely no wood about it. The corners and crevices, where vermin or dust can lodge without being easily removed, should be as few in number as possible. There should be a low iron bar at the foot as well as at the head to prevent the mattress from slipping. A little more finish can be given to the bedstead by the addition of a brass rod across the foot and head and of brass knobs on the posts. Painting or enameling with white adds much to the appearance. The length of such a bed should be 6 feet 6 inches, the width 37 inches, and the height from 24 to 26 inches. As its position has frequently to be changed, it should be mounted on rubber casters. The only objection to

these is that they make it hard to keep the bed straight, as one or both ends are readily moved by even a slight touch. It is therefore well to do without casters if enough men or a special apparatus, now commonly used in hospitals, can be procured at short notice to lift and carry any bed which has to be moved, for then the floors are not scratched, since the beds remain firm in their places. Every bed should be placed in such a position as to be freely accessible from all sides. The best form of mattress for general use is one made of prepared horse-hair, weighing from 22 to 25 pounds. After being vacated by a patient, the mattress should be disinfected in a steam sterilizer and exposed for a short time to the sunshine and air before being used again. At intervals of twelve or fifteen months it should be taken apart, the ticking washed, and the hair renovated and made up afresh. In some hospitals two layers of army blankets are used over the wire mattress, but they do not make so comfortable a bed. Straw mattresses are so cheap that they can be renewed for each patient, but unless carefully made up they are apt to be lumpy and extremely uncomfortable. Feather beds are met with only in private practice, and a nurse's ingenuity will have to be exercised to effect a change, since anyone who sleeps upon feathers in the present age is very apt to be "set" in her ways. The idea of making the mattress in three parts is not a good one, for if patients are at all restless the divisions slip apart, and, although the middle portion of the mattress can be changed without interfering with the other two, it is not much easier to do this than to put on an entirely fresh mattress or to lift the patient to another bed. Each bed should be supplied with two pillows,

one of hair and one of feathers. Frequently only one is required, and in fever cases or where there is much perspiration this should be of hair and should be protected with a case made of rubber sheeting put on under the regular cotton case. Except in unusual cases the mattress is turned daily.

The coverings should be light but warm, consisting of an upper and a lower sheet, each 2¾ yards in length, and a draw sheet 2¼ yards long and 2 yards wide. These should be made of white bleached cotton, as linen is more apt to be chilly and damp. Some light form of white cotton spread should be used on the outside, dimity being the most suitable material. In hospitals, at any rate, the usual heavy white counterpanes should be no longer tolerated. A patient is often uncomfortable with a counterpane on, though he cannot discover the cause of his discomfort, and with operation cases and fever patients they should never be used, a clean white sheet being preferable. Counterpanes also interfere with the ventilation of the bed, and, though it is true that they make a ward look well, the patient's welfare should be the first consideration.

A nurse should be familiar with the best method of making a bed for a bed patient and with the manner of changing the sheets, pillows, and the patient's linen, so that the bed may always be kept in good condition. Only a great deal of practice will make her quick and deft in the performance of this work. To make a bed for a patient who must be in it for any length of time, a mattress should be selected that is smooth and even, not worn to a hollow in the centre: the lower sheet is put on first, and should be long enough to allow the ends to be well tucked in, first at the top and bot-

tom, and then at the sides; next a draw sheet of rubber cloth, 32 inches long and 45 inches wide, is put on, the upper edge reaching to the edge of the pillow, and the lower coming down well below the place where the patient's hips will rest. The cotton draw-sheet (doubled) should cover this entirely and be tucked in under the sides; in order that it may be perfectly free from wrinkles, it can be kept in place by being fastened with a safety pin at each of the four corners to the under part of the mattress; the two hemmed ends should be at the lower end, as there should never be a seam under the patient's back. The upper sheet and blanket come next, and lastly the counterpane. The upper edge of the blanket should be protected from soiling by being folded in the counterpane, at the top, between it and the upper sheet; to keep the coverlet clean a margin of about nine inches of the upper sheet is folded back over it. In tucking in these covers at the bottom one should be careful not to draw them too tightly over the patient's toes; they must be loose enough to allow the feet to be moved about with comfort. As a matter of routine, bed-patients' beds should be made up thoroughly night and morning and freshened at mid-day. But it is to be remembered that, day or night, an occasional smoothing and tucking in tightly of the under sheet, a shaking up and turning of the pillow and a straightening of the top sheet and covers are always a relief and refreshment to restless and feverish patients. A bed that always looks fresh and well cared for affords objective evidence of good nursing.

The *changing of linen* should be managed with as little fatigue and discomfort to the patient as possible.

Unless the patient is very ill one person can do this easily. Only the upper sheet or a single blanket is to be left over him. The lower sheet and draw-sheet to be removed are loosened at the top, bottom and at both sides; on one side they are then folded along their whole length as flatly as possible until they are close up to the patient. The fresh ones should be then folded lengthwise, alternately backward and forward, for half their width, and placed on the side of the bed from which the soiled ones have been removed, and the loose halves tucked in at the side. The nurse then moves to the opposite side of the bed and turns the patient on his side with his face toward her; she can support him in this position with one hand while she tucks the sheets to be removed as closely and smoothly as possible up to his back, their place being taken by the fresh ones, which are made to follow them closely. Using both hands, the nurse now gently turns the patient toward the side away from her; the soiled sheets and the folds of the clean ones are drawn through, the former being taken away and the latter smoothed down and tucked in their place, care being taken not to leave the smallest wrinkle. Patients can often assist in this changing by means of a crane suspended above the bed, by which they can raise themselves more or less; but if a patient is quite helpless and very heavy it is best to have a second person to assist. In changing the upper covering the fresh sheet and blanket are spread over first, and the others are then slipped away from underneath. It is quite unnecessary to expose any part of the patient in changing the entire bed-clothing. For convalescents it is unnecessary to

have a rubber sheet on the bed, as its only object is to protect the mattress; when not needed for this purpose the patient is better without it, as it often causes perspiration and may be uncomfortably warm. A convalescent's bed should be well aired, and, no matter the time of the day at which a patient gets up, for a half hour or more the bed should be left open. Two chairs should be used upon which to spread the clothes when taken off the bed; one is not enough, as they are apt to drag on the floor or become piled up, so that no air can circulate through them. Each piece should be shaken separately before being laid loosely over the two chairs.

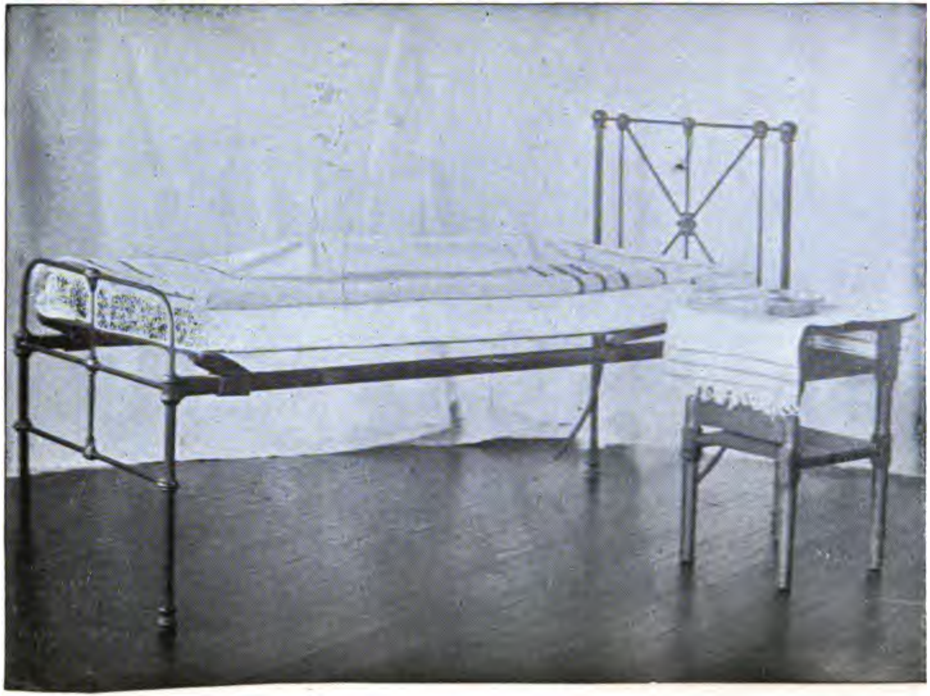
Care and economy in the changing of the bed-linen are subjects upon which nurses need special instruction. In most hospitals the bed is changed throughout after the dismissal of a patient. A convalescent's bed is changed twice a week, on stated days, a fresh upper sheet being employed and the used one being put in the place of the lower sheet. Fresh pillow-cases are provided twice a week. Coverlets, as a rule, need to be changed only once every two weeks. For bed-patients changes are made as the necessity arises. A sheet that is not soiled may be hung out in the sunshine and used again on the next day. In this way a change of sheets can be provided without extra expense for laundry work.

In a hospital ward uniformity of appearance must be maintained in the beds, as it adds largely to the general neatness of the ward. It would never do to look down the ward and see some beds all hills and hollows, others with the spreads hanging farther down on one side than on the other, or with a corner hanging out in any direction; or to see the pillows, some showing

the ticking through the end of the slip, some lying flat, and others bolt upright. After all the angles have been tucked in and the bed has been made up neatly, a general smooth appearance can be produced by running a flat stick, reaching across with some pressure, from the bottom to the top, before the pillows are put on. Ward patients are very fond of putting things away under the heads of mattresses; nothing whatever should be allowed to remain there, and their towels and bath-cloths should be neatly folded and hung on the rung of the bed just behind and below the pillows, where they will be well aired and dried if damp.

To prepare a bed for an operation patient the same process is gone through as described in making a bed for a bed-patient, with the exception that for extra warmth a single blanket is put on between the upper sheet and the patient. This, however, is dispensed with after the patient has reacted. The pillows should be removed on account of nausea, a towel being pinned in their place across the top of the mattress, so that the head may be low; two other towels should be hung over the head of the bed in case of vomiting after the anæsthetic, and a small basin placed on the bedside table. Instead of being tucked in all around the bed-covering on one side should be folded back to the edge of the mattress, so that the bed may readily be thrown open the instant the patient appears. Three large hot-water cans should be filled, encased in their flannel bags, placed in the bed, and left there until the patient is put to bed after the operation. The nurse should be particular to see that these cans are really hot and that they do their work well, for by the time the pa-

PLATE II.



SURGICAL OPERATION BED.

tient is ready to be put in bed it should feel comfortably warm throughout. This heat assists the patient in reacting from whatever shock may have been sustained from the injury or from the anæsthetic and operation. But before the patient is put to bed the cans should be removed, otherwise there is constant danger of burning him; for during unconsciousness a leg or an arm or the trunk may be tossed about so that it is allowed to rest on a hot can and a severe burn may result. This point is worthy of particular emphasis, for in spite of constant warnings and lessons, unfortunate patients are still often burned through the carelessness of nurses in forgetting this rule. Of course, when there is much shock after an injury or operation and all the warmth and stimulus possible are necessary to enable the patient to react, the hot cans or bags must be employed, but they should be carefully placed at a safe distance and separated from him by a blanket. Even then the nurse should be on the watch and frequently slip her hand inside the covering to assure herself that all is right.

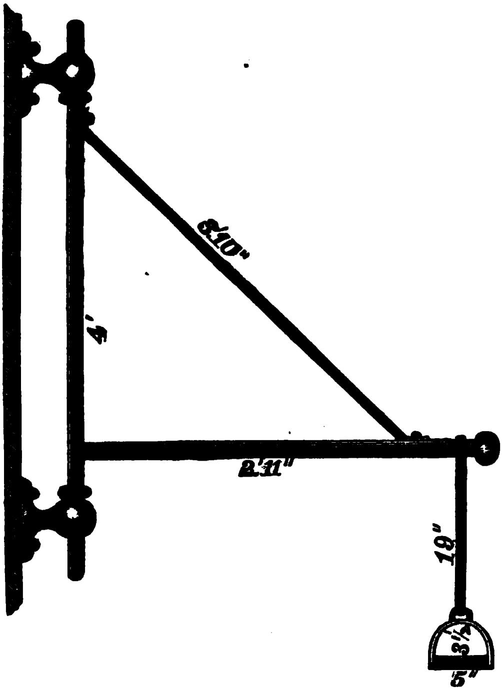
Fracture beds. Patients with fractures of any kind must have their beds made with special reference to their condition. The bed should be rendered firm and unyielding. This is done by placing under the hair mattress a fracture-board, made of slats each 1 inch thick and 3 inches wide. This will be lighter and afford better ventilation than one made of a single perforated board. Felt or cotton mattresses may also be used in cases of fracture. A cheap but excellent fracture bed can be made by packing straw very tightly and evenly into a firmly made tick and covering it over with a long heavy mackintosh, which should be pulled

tightly down and securely tied to the iron bed-frame; in any case the long rubber sheet should be used and the bed is then made up with draw-sheet, etc., in the ordinary way. Beds are also prepared in this way for spinal curvatures and other orthopædic cases. If a patient has to remain in extension or must not be moved from the bed for a number of weeks, the mackintosh should be kept fresh and clean by an occasional washing, after which it should be rubbed thoroughly dry.

Very numerous and often very complicated are the appliances which have been contrived for the relief of bed patients, but the more simple designs generally serve the purpose best. Those chiefly in use are head-rests, pillows, pads, and cushions of various kinds. It is a red letter day for the patient when he is allowed to sit up in bed for the first time. He is raised at an easy angle and supported in this position by means of the head-rest and pillows; hair and feather pillows combined will accomplish the same result, and these are generally used in private houses; but more pillows are required than when the head-rest is used, and a comfortable position is maintained with more difficulty. These rests are of many kinds, but one of the best is that made with a simple wooden frame and a canvas support, which can be used with any kind of bed. A feather or hair pillow tucked in to support the small of the back, another for the upper part of the back and shoulders, and a small circular air-cushion for the head laid against one of these rests will support the invalid in perfect comfort. An improved head-rest recently invented by Miss Nutting has a wooden frame with curved wooden cross-bars

and a wing made of wood on either side, which keeps the pillows in place. In lieu of anything better a straight-backed chair may be turned upside down, fastened in place, and pillows arranged on it. To

Fig. 1.



Crane for Assisting the Patient to Move Himself in Bed.

enable a patient to lift himself or change his position in bed, a crane will be found very convenient: this may consist simply of three bars of iron in the shape of a triangle fastened to the wall above the bed, or of a single rod fastened to the bed, to which a strap

or handle is attached which hangs down within easy reach of the patient (See Fig. 1). This apparatus should be supplied with a hinge, so that the crane is movable to the right and left, and can thus be pushed aside when not needed. Beds furnished with patent adjustments are rarely as comfortable as those which are less pretentious.

A *head-rest* is also a great comfort and support to patients suffering from shortness of breath arising from heart disease, asthma, or any other complaint which makes the upright position imperative. In connection with the head-rest the cylindrical cushion is used for patients who are inclined to slip down in bed. The covering of this is made of stout ticking 21 inches long and 8 inches thick. It has rounded ends and is stuffed firmly with horse-hair and covered with cotton slips made to fit. To the ends of this pillow, which is slipped under the patient's knees, are fastened broad bandages which are carried up the sides to the top of the bed and tied to the iron rods tightly enough to keep the pillow in position under the patient, and so prevent him from slipping down. There should be a number of such pillows supplied to gynæcological and obstetrical wards, as they often give the greatest relief to patients after abdominal operations. When placed under the patient, just so that the knees rest upon them, they act by relieving the tension of the muscles of the abdomen and back; or when placed at the foot of the bed, where the patient can press her feet against them, they accomplish the same purpose. After abdominal operations, in place of the ordinary pillow, which is too high if the patient is nauseated, a small air-cushion or a feather pillow not too soft,

and about 13 inches long and 10 inches wide, should be used for the head to rest upon during the first forty-eight hours. In the case of very weak patients, or those whom it is necessary to turn frequently from side to side, support should be given to the back by placing a pillow closely against it. Very often pressure along the spine can be relieved by partially slipping a hair pillow under the patient from either side, thus raising the middle portion of the back so that it does not touch the bed.

When a patient is confined to bed the portions of the body most exposed to pressure should be guarded against bed-sores. The most common sites are the lower part of the back, the hips, the shoulder-blades, the elbows, the tips of the ears, the back of the neck, and the inner surfaces of the knees, the heels, and the ankles. On the slightest indication of redness, even before any complaint on the part of the patient of a burning or stinging sensation in any of these places, in addition to employing the other usual preventive methods of treatment, the nurse should take care to remove all pressure from the parts threatened This may be done by means of cushions, which may be made of various shapes to suit the part to be protected. Besides the air-bed and the water-bed, there are on the market a number of rubber appliances in the way of cushions, among which we may mention the air-cushion and water-cushion, which are made square-shaped for the head and shoulders and circular for the back. For protecting the heels, ankles and inner sides of the knees or the back of the head, a circular pad of a suitable size can be made of ordinary cotton batting. The cotton is held firmly in place by

a gauze bandage passed around it several times, a hole being left in the center which comes directly under the tender point, while the surrounding parts rest on the cotton. These pads are inexpensive and may be renewed frequently. For a small spot on the back, side, or heel, they answer every purpose (See Fig. 2). A few turns of a bandage will hold one in place, unless the back has to be protected. Where a rubber

Fig. 2.

HEEL CUSHION.

ring is not available for the back in a case of bed-sore, a very good substitute may be found in a circular cushion made either of rubber cloth or of a double layer of oiled muslin stuffed with horse-hair. This can be washed, and by having two they may be changed and so kept fresh and free from odor.

Cushions of any size can be made of bran or fine sawdust. They are soft and comfortable, and can be burned and renewed at little cost. In making them care should be taken not to fill the case too full.

Water-beds and *air-beds* are sometimes ordered for

patients who are predisposed to bed-sores, or for those who already have very bad ones, or who are in a perpetual state of moisture, a condition which is also likely to destroy a hair mattress. For paralytics they are indispensable. In getting a water-bed ready for use, the wire springs of the bed-frame are covered with a long heavy mackintosh, and upon this is placed the water-bed ready to be filled. Care must be taken to have it laid on the bed-frame exactly as it is to remain, for when once filled with water, it is too heavy to be readjusted. The end with the opening through which the water is to be poured should come at the foot of the bed. The filling is done by means of a hose, or, if this is difficult to manage, the water may be poured in from a large pitcher through a funnel. The temperature of the water should be carefully tested, and should not be less than 100° F. This will allow for some slight cooling when it comes in contact with the rubber of the bed: if the patient has been ill long and is in a weak condition, he should in no case be put upon it if the bed temperature is less than 98° F. To prevent the patient from rolling off the bed when filled, a wooden frame should be placed around it, both sides of which should be bevelled or else the sharp edges of the boards should be padded. An air-bed is arranged in a similar manner, except that the air is introduced with a force-pump and attention to the temperature is unnecessary. Rubber beds should be washed off and disinfected from time to time. No pins must be used in these cases, because a pin-prick might cause the bed to collapse and render it useless; this is an important point, as these beds are very expensive.

A bed-cradle is a support upon which the bed coverings are made to rest in cases of wounds, fractures and in other cases in which sensitiveness or pain is caused by pressure. They are made of iron or wood and are either oblong or semi-circular in shape. In emergencies one can be readily made from the halves of barrel hoops.

To become expert in lifting and moving sick people requires a deal of practice, and a beginner should not be left alone to perform this office for the sick. She should at first assist an experienced nurse and thus learn the proper methods. It seems a difficult matter for many nurses to understand that, in moving her simply to change her position, it is of the utmost importance to support the patient: if this be properly done, quite a heavy person can be moved with little difficulty and without hurting her at all. Occasionally the complaint is made that a nurse has injured her back or strained herself in some way in moving a patient. This will generally be because she has failed to do the lifting properly. To move a heavy or medium-sized person in bed the nurse should put her right hand and arm obliquely under the patient's back, the hand being carried well down under the back, the patient's shoulder resting in the hollow of her own; the left hand is next put over and slipped well under the patient's other shoulder. The upper half of the body is now lifted gently and evenly and placed in the fresh part of the bed; the right hand being now slipped under the lower part of the back and the left just below the hips, the other half is moved over. To lift toward the head of the bed the right hand is placed well under the back, the heavy part of the

shoulder being supported with the upper part of the arm and shoulder, and the left hand being placed below the hips: one then lifts gently and firmly. In doing this the greatest weight is thrown upon the right arm and shoulder. The patient can sometimes render some assistance by clasping the hands around the nurse's neck. In the same way support should be given with the left arm when raising patients to readjust or arrange pillows, the head being allowed to rest against the nurse's shoulder while the back is supported with the hand, the other being used for putting the pillows in place. The head and shoulders are then placed back against the pillows with an easy, gentle motion. It is the height of awkwardness to pull or drag a sick person about the bed when working over her. The ideal way to change a bed patient is to have two single beds of the same height, one for the day and one for the night, each being provided with its own set of blankets, sheets, etc. The patient may be transferred from one to the other by placing the beds close together and drawing the mattress with the patient on it a short distance over that on the other bed; the occupant may then be transferred to the second bed by pulling on the sheet upon which she is lying. If there be a second nurse to assist, one can take the sheet at the head and the other at the foot of the bed, and, both lifting carefully and at the same moment, the patient can be placed in the middle of the adjoining bed without the least jar, after which the sheet may be slipped out from under her. After abdominal operations this method is quite safe, but, of course, with some surgical cases moving is altogether out of the question. If two such beds are

not procurable, as is often the case, a lounge may be wheeled up close to the bed, the patient, together with the sheet, lifted upon it, and left there until the bed has been aired and changed. Another excellent way is to have two mattresses with one bed: one person may draw away the mattress on which the patient is until it is half way off the bed; then the second mattress is put on close to the other, and the patient drawn by the sheet over upon it. It will afterward be easy to slide it the rest of the way on the bed. If the patient is to be carried to a lounge, this should be placed at the

Fig. 3.

RUBBER PROTECTIVE PAD.

foot of the bed (with its head towards the foot of the bed) in such a position that the carrier need take only two or three steps from the bedside: he thus has to do no turning, and can lower the patient gently. Similarly, when the patient is to be transferred to it, the invalid chair must always be placed with its back towards the bed. When one is carrying a patient, it is best to straighten one's self up and allow the weight to fall upon the chest and front part of the body, since strain on the lower part of the back is thus prevented.

A small bed-side table, of the same height as the

bed, is often a comfort to a bed patient suffering from heart disease or whose arms need extra support.

For the purpose of saving the mattress and bed-linen, and of obviating the necessity of disturbing the patient at too frequent intervals, a much less expensive protection is afforded by the rubber protective pad (See Fig. 3). It consists of a flat circular piece of rubber, 29 inches in diameter, around the edges of which is attached a hollow rim, which when inflated measures five inches in diameter. A square pad of gauze or old linen may be spread over it before placing the rubber pad under the patient. With this pad it is possible to keep a bed perfectly dry and comfortable in the worst forms of involuntary evacuations; its use will effect a great saving of the patient's strength, of time and of laundry work. Before being replaced it should be washed off, dried, and fresh gauze should be spread over it.

CHAPTER VI.

Care of New Patients.—Treatment.—What to Observe.—Reporting to the Physician.—Care of the Bed Patients.—Frequency of Bathing.—Care of the Teeth and Mouth.—The Prevention and Treatment of Bedsores.—Care of Convalescents.

The first attention a nurse gives to a patient will depend entirely upon the condition he is in when placed under her care or when brought into the ward. He may be able to walk, or possibly just strong enough to be moved if seated in a wheel-chair, or, on the other hand, he may be so helpless than he has to be carried, and that, too, in the gentlest manner possible. A stretcher will be found most convenient for moving such patients. This should be made of stout canvas, 6 feet 6 inches in length and 2 feet wide, with hems on either side wide enough to allow two hardwood poles, 7 feet long and 2 inches in diameter, to be pushed through them; the poles are kept in place by means of a movable cross-bar at each end, which prevents the two sides from folding together.

In every hospital with free wards there should be two receiving-rooms—one for men, the other for women. Each should be provided with bath-tubs and all requirements for giving the first bath, and in addition there should be kept here a stock of wrappers, night-gowns, stockings and slippers, gray blankets, and a bed. A patient who is able to walk or to be moved in a wheel-chair should be taken directly to this room, and

at once given the first bath; a nightgown, wrapper and slippers are then put on, and the patient with a blanket wrapped around him is sent into the ward. Except in a case of emergency no patient should be taken to a free ward with his own clothes on: these should be removed and he should have at least one bath, either in bed or in the tub, before he comes near other patients. His clothing should be inspected and a list taken, after which all articles are sent to the disinfecting oven in a covered metal box. After sterilization they are sent to the laundry to be washed, or if clean enough are hung up carefully in the patients' clothes-room—a large room well ventilated and set apart for this purpose. Sometimes, however, a patient is admitted in an extremely critical condition: then no time should be lost, and the physician orders such a patient to the ward at once. In anticipation of such cases, one bed should be kept freshly made up, so as to be ready at a moment's notice. If the patient is very dirty as well as very ill, the upper coverings should be thrown back and a long rubber sheet spread over the bed; a bath blanket is thrown over this, and the patient is lifted into bed. A second bath blanket is now thrown over him, and, when necessary, the regular bed covering is added. In this way the clean bed is protected and there is no need for any extra moving of the patient if the doctor sees fit to order a bath in bed. After the bath, the rubber and blanket can be easily slipped out, and the patient rests in a perfectly clean bed.

The bath-room and clothes-room should be quite separate from the wards, but so few hospitals have this system that we shall consider in detail the other plan,

according to which all patients are taken directly to the wards, where the nurses, besides other necessary attentions, give them their first baths and look after their clothing and valuables. If a patient walks in, he is usually given a chair placed in the hall or room outside the ward until the doctor has given orders in regard to him. The head nurse should immediately report the admission of a patient to the ward, and under no circumstances should she neglect to do this. A nurse should be detailed at once to look after him, to see that his chair is comfortably placed out of the way of draughts and of passers-by. His general condition is then noted. The temperature and pulse are taken first, and if any special symptoms are present these should be reported at the same time. The doctor will then give his orders, but if there be any delay while waiting for him, the patient must still be kept under observation and made to feel that he is receiving attention and consideration. An air of kindliness and consideration on the part of the nurse means a great deal to a new patient. Possibly he would like a glass of water, or if he has not eaten for some time and is in need of food, he may feel too strange and frightened on his entrance to a hospital to make his wants known, and the nurse should not wait to be asked, but should inquire herself. As milk is usually a safe form of diet, a glass of it may be given without hesitation. If a bath is to be given, in a woman's ward this duty devolves upon the nurse, in a male ward upon the orderly. In giving the first bath any peculiarity about the patient should be noted, and the presence of swellings, lumps, scars, sores, or any kind of rash should be reported at once to the head

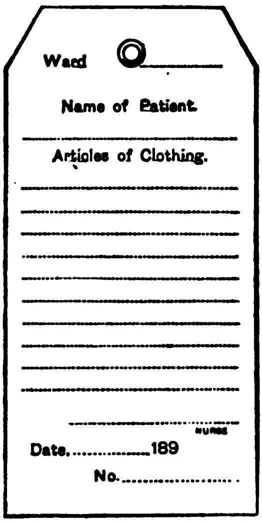
nurse, whose duty it is to inform the doctor. After the patient has been cared for, attention is next given to the clothes and valuables. The nurse in charge finds out from the patient if he has money or other valuables. She makes a list of these in a book kept for the purpose, to which she signs her name, and hands them over to the hospital clerk, who deposits them in the safe. Absolutely no responsibility should be assumed by a nurse for the valuables of any patient, and whatever is retained by him remains at his own risk. If nurses do not adhere strictly to this rule, sooner or later trouble is sure to follow. The inspection of the clothing is a duty which usually falls to the lot of the probationer or junior nurse. She should examine each article carefully to be sure that it is quite free from parasites, and if the clothes are contaminated in this way or soiled they should be listed and sent to the disinfecting oven or to the laundry; in the latter event they should be marked with the patient's name and ward. If, however, they are clean, all the smaller articles should be neatly folded together and wrapped in a large square of coarse gingham to protect them from dust; the dresses or coats should be hung up in the division of the clothes-closet assigned to them, the small articles being placed on the shelf below in a compact bundle, to which is attached a tag on which is written a complete list of the clothes, with the date and name of the patient and the signature of the nurse. (See Fig. 4).

After the patient has been put to bed and is rested and quiet—that is, in about an hour—his temperature and pulse should again be taken, as the first record may be untrustworthy if, as is likely to happen, one

or both have been influenced by the excitement of coming into the hospital. A specimen of urine is now obtained (from women always by catheterization), and kept for the doctor's inspection; at the same time one ascertains whether or not the bowels are in a normal condition.

If a new patient is very ill, if he has a chill, or if

Fig. 4.


Ward ________

Name of Patient.

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Articles of Clothing.

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NURSE

Date................189

No.....................

FORM FOR LISTING THE CLOTHES OF A PATIENT.

the body or feet are cold, hot bags or cans are to be applied without delay. From the moment a patient enters the ward every possible provision for his comfort should be made. In this work a large share of the responsibility devolves upon the nurse. A properly made bed, strict cleanliness of the patient and everything about him, the prevention or care of bed-sores,

suitable food attractively prepared and served, the administration of the medicines ordered and the carrying out of other therapeutic measures—such as the various applications, baths, or massage, or the changing of soiled dressings in minor surgical cases—all these belong to her province, so that to a large extent the life and health of the patient are in her hands. Of course in the male wards an orderly is provided to perform certain duties, but the nurse is responsible for seeing that all orders for such patients are carried out. The catheterization of male patients is usually assigned to one of the junior assistants on the medical staff, but in the children's ward the nurse should be given an opportunity of learning the proper method of procedure in view of possible future emergencies in private duty. In hospital work under all circumstances the modesty of all concerned should be regarded. In a ward all kinds of work should be done behind screens, and suitable dressing gowns should always be provided for the patients to use in going to and from the bath-rooms or lavatories. The daily personal care of the poorest patient should afford opportunities for the exercise of all the refinements of nursing.

It may be impossible to give a full bed-bath at once to an invalid in a weak condition or to one to whom the bath is disagreeable, and we often have to proceed gradually. If the physician makes his rounds at a very early hour it will be impossible to complete the toilets of all the bed patients, but care should be taken to see that their faces, mouths and teeth have been washed and that the beds are clean and in order. The finishing touches may then be left

until the rounds are over. When there is plenty of time a full bath should be given to a bed patient every day, and in some cases this is absolutely necessary; but if there are many to be bathed in a limited time, each should have a daily bath at least at far as the waist, particular attention being devoted to the spaces under the arms. The surfaces between the thighs should also be cleansed daily and a full bath given twice a week. Absolute cleanliness of the body and of the bed are two most important factors in hastening convalescence. After the daily bath the finger-nails and toe-nails should be pared and cleansed. A bed patient's hair should be washed occasionally: if precautions are taken, no danger of taking cold need be feared. The pillow and shoulders are protected with a rubber sheet, the patient is moved over to the side of the bed, and two basins are placed on the adjoining bed-table, one containing a warm solution of borax (about 2 drachms to the pint) the other warm water for rinsing. The washing can then be done quickly and easily. The hair is rubbed thoroughly and spread out on the rubber cloth until it becomes quite dry. To free hair from parasites the head is bound up for two or three days in a cloth soaked in a 1:20 (5 per cent) solution of carbolic acid, which is kept moist all the time, the pillow of course being protected by a rubber slip; or else the head is covered with a cap of oiled muslin. After the hair is dry, alcohol is rubbed in about the roots to destroy the nits, which soon after drop off. A quicker method consists in soaking the hair in pure kerosene oil for half an hour and then rubbing it well with alcohol. In a free ward it should be the rule to have every patient's head examined

carefully. In the case of a woman who is too weak to have all her hair attended to at once, a part only should be done at one time; thus one braid might be dressed in the morning and another later. The hair, however, should never be allowed to go uncared for more than twenty-four hours, and if it be handled deftly, the dressing will be a pleasure to the patient instead of the ordeal it sometimes proves to be. Here, again, success comes only from much practice and perseverance. Every time one has long and difficult hair to care for, one more opportunity is afforded for practice, and the process should not be hurried through, but the nurse should try each time to make some improvement in her methods. The arrangement of the whole head should not be attempted at once: it is best to part the hair into two strands at the back, and then take one side, this again being sub-divided if necessary. The combing or brushing should be done gently but firmly: we should begin at the ends and work upward, the hair being always grasped with the left hand at some point between the comb and the head, so that there may be no jerking or pulling. The best way to dress the hair is in two braids, care being taken to draw each well over to the side and to braid low down just below the ear, so the patient may not have to lie on two hard lumps of hair. The first two or three turns taken should be looser than the subsequent ones.

The mouth and teeth are to be carefully looked after, and as far as possible kept clean and sweet. The condition varies much in different patients. Where the accumulation of sordes and mucus is rapid, and where the lips and tongue are stiff and parched, at-

tention may be needed every hour, but in ordinary cases twice a day or after each meal will usually suffice. The mouth should be kept as moist as possible, the same treatment being carried out through the night as during the day. Night nurses are not so attentive as they should be in this regard, and often this neglect occurs not so much from lack of time as from want of thought. There are various mouth-washes in use. A weak solution of borax answers as well as anything. Listerine is very cleansing and has disinfectant properties. A glass of water containing half an ounce of listerine left on the patient's stand to be used when desired often gives great relief and comfort. A solution of lemon-juice, glycerine, and distilled water is refreshing and softens the tissues; but where fissures appear they are to be treated with frequent applications of lanoline, vaseline or cold cream, to which may be added a few drops of the oil of peppermint or wintergreen. Where the gums are soft or spongy and sore a few drops of the tincture of myrrh added to pure water may be used. The best sponges for washing out the mouth are made of small squares of dressing gauze or old linen, since these can be burned immediately after being used. One of these squares should be wrapped about the index finger, dipped in the wash, and inserted into the mouth. Every portion of the cavity should be well gone over, the sponge being passed along the gums and inserted behind the wisdom teeth—a place often neglected—thence over the roof of the mouth, inside the teeth, and under the tongue. If the tongue is badly furred, it should be soaked and then scraped. A good mouth-wash for

general use is: Glycerine ʒj Sodium bicarbonate grs. x, Saturated solution of boric acid ℥j.

A patient's linen should be changed frequently, as a clean bed and body linen go far to refresh and relieve restlessness. The nightgown and at least one pillow and sheet should be changed night and morning. It does not necessarily follow that those taken off should always be sent to the laundry; unless stained, they should be hung up in the fresh air and sunshine for several hours, then warmed and put on again. Old, fairly plain, soft nightgowns are the best in illness, and the same holds good for the bed-linen and towels. Where there is much perspiration old soft flannel or flannelette nightgowns are preferable, and in any case a soft flannel jacket is useful for covering the shoulders and arms when the patient sits up in bed.

To guard against *bed-sores* is one of the first injunctions given to a nurse who is entrusted with the care of a bed patient: the danger of such an occurrence varies with the nature of the disease and the weight of the patient. Very fat, flabby individuals and emaciated patients are liable to suffer from this complication. It is just here that good or bad nursing tells, and the development of a bed-sore while the patient is under a nurse's care gives ground for severe criticism. Bed-sores result from continuous pressure on a certain spot or spots, also from friction between two surfaces, from moisture, creases in the under sheet, nightgown, or rubber, from crumbs in the bed, and from lack of proper care and cleanliness; their formation is favored by all conditions in which the nutritive processes taking place in the body are faulty. Bed-sores

due to pressure occur most frequently on the hips and lower part of the back, the shoulders and the heels, the continuous pressure lessening the circulation in these parts and the vitality in the tissues and skin being correspondingly lowered; those from friction are apt to come on the ankles, the inner surfaces of the knees, or on the elbows and back of the head from frequent movements in the bed. Those resulting from malnutrition of the entire system may appear at almost any place where there is the slightest pressure, and may show themselves first in the form of pustules, which are followed by a rapid breaking down of the tissues. This last variety is the most difficult to prevent, and even with the utmost care they are sometimes unavoidable. In patients suffering with œdema, paralysis or spinal injuries or where there is a continuous discharge from any part of the body, the utmost care on the part of the doctor and nurse will not always avail; but generally speaking, bed-sores can be avoided, and are amenable to treatment. Preventive measures consist in absolute cleanliness and the removal of pressure. For the latter, various mechanical appliances are employed; these will be described in the next chapter. The back and shoulders should be bathed with warm water and soap night and morning, gentle massage being employed to keep the skin clean and active; they are afterwards rubbed with 50 per cent. alcohol or a solution consisting of an ounce of burnt alum in a pint of brandy. Finally the parts are dusted thoroughly (since such applications harden the skin) with some kind of powder which will absorb the moisture. For this purpose the oxide-of-zinc or stearate-of-zinc powder or bismuth mixed with borax are of equal value. If

there is much moisture due to perspiration or involuntary evacuations, in addition castor oil should be well rubbed in. The sheets must be kept perfectly smooth and dry under the patient: sometimes even a slight wrinkle will produce redness and tenderness. As a matter of routine a bed patient's draw-sheet should be brushed off and drawn after each meal. The first indication of undue pressure is redness of the skin; the patient may complain of a stinging sensation, but we must never depend upon him to report this, but must be on the watch all the while, so that the first sign may not escape us. Again, the redness may be followed by a dark color under the skin, and when the cuticle finally comes off the underlying tissues are found to be broken down and sloughing. Any abrasion of the skin should be carefully washed, and a small pad of cotton smeared with olive oil and stearate of zinc placed over it and kept in position with celloidin. Painting the surface with white of egg is fairly satisfactory. Another excellent dressing is a mixture of equal parts of castor oil and bismuth. The pressure may be removed by means of rubber or cotton rings. A change of position is advisable, and where it is possible, the patient should be turned on his side, the back being supported with a pillow well tucked in. Avoid putting a patient on a blanket as the extra heat produces moisture which softens the skin and thus favors the formation of bed-sores.

If, however, in spite of our precautions, a bed-sore has formed or a patient is admitted with one, the physician is to be told at once, as he may prefer to outline the treatment himself: often, however, it is given over to the care of the nurse, and then should

be treated like any other wound. The part is sponged clean with soft gauze sponges, a solution of boric acid or a weak solution of carbolic acid being employed, and the cavity packed with strips of iodoform gauze or treated with iodoform or aristol ointment, over which a layer of borated cotton is applied. The whole is sealed with a layer of gauze dipped in celloidin. The sore should be dressed daily. If there be a slough, hot boric dressings should be applied every four hours, followed by an application of castor oil and balsam of Peru until granulations are established. After this for rapid recovery the treatment applicable in the case of abrasions can be used. Sloughs may also be removed by poultices, but these are seldom or never ordered now, as they often tend to weaken the surrounding tissues, and thus favor pus-formation. Weak granulations may sometimes require stimulation: where they are too exuberant some caustic application may be indicated. The formula for the celloidin solution will be found elsewhere. With this preparation the use of rubber plaster to hold a dressing in position is quite unnecessary. Ordinary adhesive plaster is undesirable, not only because it is uncleanly, but on account of the irritation which it produces and the difficulty and pain experienced when it has to be removed.

In the first stage of convalescence from an acute disease, when the temperature has become normal or nearly so, a limited soft diet is ordered, and if the patient is allowed to sit up in bed, he is to be supported by a head-rest or with pillows, In the next stage he may be allowed a little solid food and may sit up out of bed (at first only for a few minutes, the

time being gradually prolonged each day), and from this on there will be a gradual increase in privileges until strength is restored. The second stage is more or less prolonged according to the particular case, but not until a patient is discharged do a nurse's duties cease, although their nature will be somewhat changed. With the gradual return to health the diet will need to be more varied; each day has to be planned out so that a judicious amount of amusement, rest and variety, shall enter into it. All these arrangements fall within the nurse's province, and the shortness or tediousness of convalescence will depend largely upon the measure of success attained in her management of it. Each patient must be treated as an individual, and the plans must be varied according to his idiosyncrasies and the nature of the trouble from which he is recovering. Especial attention is required during convalescence lest too much be attempted and bad results follow. The temperature and pulse should be taken and recorded twice in the twenty-four hours, the amount of sleep should be noted daily, and the increase in weight determined about once a week.

When the patient sits up in bed a flannel vest should be placed under the night-gown, and the shoulders should be well protected. A loose flannel dressing-jacket is comfortable and looks well. Nightingales are very convenient to put on and off; they fit well about the shoulders, and are in every way best for hospital use. They may be made of a double thickness of outing flannel, are inexpensive, and do not shrink in washing. Unless the weather is very warm, gray blankets should be wrapped about patients when out of bed or when in the wheel-chair. White bed

blankets should never be used for this purpose. If a patient can sit up in a chair to have his bed made, his feet and body are to be well enveloped in blankets. Long loose warm dressing-gowns are the best to use in moving to and from the bed, as they are easily put on and off, thus saving the patient's strength. The temperature of the room should be slightly increased when the patient is out of bed.

Seeing too many friends is one of the chief evils that may befall a convalescent; friends in their joy that the danger is over do not realize that the patient's strength has not yet returned, and should the nurse forget this fact and allow two or three persons to visit him at one time, and another set almost immediately after, much harm may result. It is just as important during convalescence as when he is in bed that the patient should be protected from excitement and from any overtax of the nerves and strength: one or two visitors singly at the most are sufficient for one day, and even then the time should be limited, and no visits whatever should be allowed after 8 in the evening. A patient should have been cared for and settled for the night by 9 or 9:30 at the latest; even if he shows an inclination to talk still later, the nurse should use tact to prevent it. The patient should be bathed, the bed freshened, the ventilation regulated, the room settled and darkened, a glass of milk or some nourishment given, and finally the back gently rubbed for a few minutes, without any conversation whatever taking place.

It is to be regretted that our large general hospitals afford so little accommodation for patients suffering from chronic disorders; not only for the sake of these

unfortunates themselves but for that of the nurse whose training should fit her to care properly for all sorts and conditions of patients. It would certainly be a good thing if a special course could be provided for nurses which would teach them the many ways outside of the practical nursing duties in which they could make themselves acceptable to convalescents and chronic patients.

If the condition of a patient at any time shows a marked change for the worse, the nurse should at once notify the physician, and without instructions from him she should never willingly assume the responsibility of being alone with a dying patient. Some of the signs by which the approach of death may be recognized are a pinched sharp look in the face, coldness of the extremities, a dark-bluish color of the finger-nails, and a dusky pallor of the face. Death actually occurs through the stoppage of the heart or syncope due to failure of the circulation, or by the failure of the respiration or asphyxia. The exact time of death should always be noted.

Everything should be done for the peace and comfort of the dying patient, but judgment must be exercised inasmuch as meddlesome attentions may sometimes cause positive distress. Thus to give stimulants frequently after the act of swallowing has become a great effort is not advisable. The duty of informing the friends as to the patient's condition rests with the physician, but in his absence this sometimes devolves upon the nurse. It will lessen the mental strain to remember that the actual suffering felt by the dying is practically nil, as towards the end the process becomes purely mechanical.

Whether she is in a hospital or on private duty, a nurse should always see that the proper arrangements are made after death. Her duties to her patient do not cease until the body has been decently cared for and the bed and room have been left in perfect order. In a hospital it is desirable to remove all traces of death as soon as possible, on account of the other patients. The limbs should be straightened before rigor mortis or stiffening of the muscles begins, the eyes should be closed, and the jaws held in position by means of a support placed firmly under the chin; for this a roller bandage or a small piece of wood which has been covered with some soft material is generally employed. The nostrils, mouth, rectum, and vagina should be packed with common or absorbent cotton in order to prevent the escape of the post-mortem discharges. After this has been done the body should be bathed with a 2 per cent. aqueous solution of carbolic acid; if there are any wounds, they should be covered with fresh cotton and then neatly bandaged; if it be necessary the hips may be enclosed in a large triangular binder; the knees are to be held together by a broad bandage; the hair should be brushed smoothly; and finally stockings and a simple night-gown should be put on. If the case be one of infectious disease, the body should be wrapped in a sheet which has been wrung out of a 5 per cent. aqueous solution of carbolic acid, and which should be kept damp. In a hospital, as soon as these preparations have been completed, a card should be made out with the name of the patient and of the ward, together with the hour at which death has occurred; and this should be sent with the body, which is to be

at once removed from the ward. A nurse should never mention or discuss a death with any of the patients. When on private duty, as a rule, the nurse has little further to do; but if it should be necessary, she should be ready to offer suggestions, so that the arrangements may be made with as little trouble to the family as possible. She should not leave the room until all is in order and all traces of her work have been removed. Where there is no one else to look after the proper disinfection of the room, the duty of seeing that this is properly done will devolve upon her.

CHAPTER VII.

BATHS.—CLASSIFICATION.—TEMPERATURE.—BATHS FOR CLEANLINESS.—TUB-BATHS.—FOOT-BATHS.—BATHS AS THERAPEUTIC AGENTS.—MUSTARD BATHS.—SIMPLE HOT BATHS.—HOT-AIR, STEAM, OR VAPOR BATHS.—SALT-WATER BATHS.—BRAN AND STARCH BATHS.—SPONGE-BATHS AND TUB-BATHS IN TYPHOID FEVER.—THE COLD PACK.—THE CONTINUOUS BATH.

Baths may be classified according to the temperature at which they are employed, the special purpose for which they are used, or the method of their preparation. Simple baths are usually spoken of as hot, warm, tepid, or cold. Thus, broadly speaking,

A hot bath	may vary	in temperature	from	100° to 112° F. or higher.
A warm	"	"	"	90° to 100° F.
A tepid	"	"	"	70° to 90° F.
A cool	"	"	"	65° to 70° F.
A cold	"	"	"	33° to 65° F.

The temperature of baths for healthy infants and young children may vary from 85° to 90° F.

The baths that come within the province of a nurse's work are given for cleanliness, to reduce fever or inflammation, to induce perspiration, to produce general relaxation, or to modify the circulation of the blood. The temperature and duration of a bath for any given patient are determined by the physician.

Baths for cleanliness may be given either by sponging the patient while in bed or by immersing him in a bath-tub. To give a bed-bath a nurse must first have on the spot all the things which she will require. It

is exceedingly bad management, and not a little trying to the patient, if, when once she has begun her work, the nurse is obliged to stop at intervals to fetch something not at hand. The old proverb, "The head should save the heels," applies no less here than elsewhere in a nurse's work. As the time for the morning bath is also that for changing the bed-linen, the fresh sheets, pillow cases and night-gown should all be warmed and ready to put on; the face and Turkish towels, brought at the same time, should be warmed by hanging them before the fire or by wrapping them around a hot-water tin. The nurse should have beside her a good-sized pitcher of hot water and another of cold water, a slop-jar for changing the water, a bath basin, and two single bath blankets. The other necessary articles will be found in the nurse's toilet-basket. The night clothes are taken off the patient, and she is allowed to lie between the two blankets. The body is to be bathed in separate sections, each being thoroughly dried at once, the face, neck, and arms being first taken, then the chest and abdomen, next the feet and legs, and finally the back and surfaces between the thighs. The entire bath can be given under cover, or at any rate no more than one part need be exposed at one time, and the whole procedure should not last longer than fifteen or, at the most, twenty minutes. The first bath, however, may of necessity take longer than this, and if a patient is very dirty a few drops of aqua ammonia or a little borax powder added to the water will be found useful. Either of these will be of advantage if the odor of perspiration is unpleasantly strong; in any case, a little alcohol or eau de Cologne will be found refreshing, though to some

patients even this may not be agreeable. Towels should be used generously; cold, damp ones should never be employed. The water should be kept pleasantly warm by being changed twice or three times during the course of the bath. If the patient seem exhausted after it, a glass of hot milk or some form of light food may be given, and if the feet are at all cold a hot can should be applied.

Some nurses are extremely untidy about giving a bed-bath. On entering a ward one is sometimes confronted with a screen about a bed, from underneath which, strewn all around on the floor, can be seen, perhaps, a hot-water can no longer needed, the nurse's dressing-basket, a towel or two, or the soiled linen just removed from the bed. Such a scene speaks louder than words for careless work on the part of the nurse in charge.

Patients, if wheeled into the bathroom, can frequently take their bath in the ordinary tub, or at the bedside if a portable tub be procurable. If able to give themselves the bath, the nurse must remain near at hand, lest they should become faint or need any assistance. In giving a patient a bath, a sheet is spread over her and she is lifted in, the sheet being left to cover over the top of the tub, since it would otherwise interfere with sponging. The method of giving the tub-bath in the case of typhoid-fever patients is described elsewhere. When ready for bed the patient may be lifted out again under cover of the same sheet, and placed on a second, well-warmed, sheet, in which she is wrapped. A blanket is then thrown over her, and she is left for a few moments until all moisture is absorbed and she is rested.

Foot-baths may be given in bed, but a rubber sheet must be spread across the lower part of it in order to protect the mattress. The patient lies on her back, bends the knees, and places her feet in the tub, which is arranged lengthwise in the bed. The same method is followed in giving a mustard foot-bath, except that the knees and foot-tub are enclosed in a blanket. Mustard foot-baths are often prescribed for severe colds where the symptoms are mainly confined to the head, and for headaches where there may be too much blood going to the head, the object of the bath being to dilate the blood-vessels of the extremities, thus bringing more blood to these parts, and in this way equalizing the circulation. Hot water alone will do this, but the addition of mustard hastens and increases the effect. The amount of mustard to be used varies according to the strength of the mustard and the sensitiveness of the skin; it should be mixed with a small amount of water and made into a paste before being added to the bath. The feet are allowed to remain in for from fifteen to twenty minutes, the water being kept at the same temperature or made warmer by adding more hot water from time to time; they are then taken out, wiped gently, and tucked in snugly with blankets. Where it is necessary for any reason to increase the circulation in the lower extremities, this is usually the method employed—a procedure often advantageously combined with friction and the application of hot-water bags or cans.

The physiological action of the different forms of the *hot bath* (hot-air, vapor, and steam bath) is very much the same. When given to induce perspiration (diaphoresis), the utmost care should be taken to see

that the preparations are thoroughly made and that each step is successfully carried out, for without such precautions the labor will be in vain; and it is folly to produce but a partial result where only a copious perspiration will be of any avail. To give a hot tub-bath for this purpose, the tub is half filled with water at 100° F., and drawn to the bedside; the patient is lifted in and the temperature of the water gradually increased until the thermometer registers about 110°-112° F. This temperature is maintained for from twelve to fifteen minutes, after which the patient is lifted out into a prepared bed, on which a long rubber is spread with three or four hot blankets over it; these are to be wrapped all around her, tucked in closely about the neck, and watched continually so that no air enters. Plenty of water is given to drink, as the more fluid there is in the body the more profuse the perspiration will be and the greater the amount of the impurities removed. After the sweating process has been kept up for about an hour, the patient is gradually uncovered, sponged under a blanket with alcohol and water, and the wet blankets are removed. During such baths cloths wrung out of cold water are applied to the head. It is well to keep the fingers on the pulse when the patient is in the bath, and on the first indication of faintness to remove her to bed immediately.

The hot water dilates the superficial blood-vessels, the pores of the skin or sweat glands have their activity increased, their orifices are freed from any accumulation, and urea and other waste matters in the blood, which normally should have been given off by the skin, or which have been retained in the system owing to an

inadequate excreting power of the kidneys, are carried off with the perspiration. This effect continues only as long as the vessels are well dilated and the skin-glands active, and, as we have said, is much assisted by copious draughts of water. As regards the time during which the bath should be continued no hard and fast rule can be given, one patient obtaining the whole benefit of the treatment in half the time that would be necessary in the case of another.

Hot baths should not be given during the menstrual period or in the last stages of pregnancy.

Warm baths are frequently prescribed for convulsions in children, as the heat relieves the muscular tension and pain, equalizes the circulation and produces sleep. When given for influenza they are often ordered hot at first, the temperature of the water being afterwards reduced by the addition of cold water in order to produce a better reaction.

When pilocarpine or some similar drug is ordered, its diaphoretic action should be assisted by wrapping the patient in two or three dry blankets, placing plenty of hot cans at the sides between the blankets, and over all spreading a large rubber sheet to condense the heat and exclude the air.

Unless special appliances are available for giving the hot-air, vapor, or steam baths, it is difficult to make them thoroughly successful with only an average nurse, and it is better to rely upon the hot-water bath. The *vapor bath* presents the least difficulty. The patient is placed on a long rubber sheet and blanket and covered with another blanket, tucked in snugly about the neck. Over her are put two small bed-cradles, high enough to support the weight

of the covering; the cradles are covered with two blankets, and over all comes a long rubber sheet, which is pinned with large safety pins at short distances along the sides of the mattress, rendering the enclosure as air-tight as possible. A small opening is left at the end of the bed for the introduction of a long tin spout or rubber tube attached to a kettle of water, which should be kept boiling by means of a small gas stove or alcohol lamp. A patient can be left thus for from half an hour to an hour, and is then sponged as after the hot bath. This is the most simple form of steam apparatus and can be readily improvised in private practice. A small Arnold steam sterilizer can be converted into an excellent steam kettle by making a small hole in the top into which a pipe can be inserted. More elaborate forms of apparatus are commonly found in hospitals. An alcohol lamp, kettle and tube can be used for moistening the air of a room in cases of croup or other laryngeal diseases.

For a *hot-air bath* air may be heated by means of an alcohol lamp and introduced under the canopy. The temperature of the air for a hot air bath at first should range from 120° to 130° F. When the latter temperature is reached a small opening should be made at the top of the tent which should be utilized periodically in order to allow of the escape of the moisture. When the atmosphere within the tent is dry the heat may gradually be increased until it reaches 200° F.

If the patient is able to sit up he may be put on a chair with his feet in a foot-bath of hot water; the clothing being removed, he is then covered in closely with blankets fastened like a tent from his neck down around the chair and reaching to the floor. An alcohol

lamp in a large tin basin underneath the chair is then lighted, and if the patient is kept well wrapped up he will soon perspire freely. After he returns to bed, he is sponged as after other baths. For the "baking process," *i.e.*, the treatment with dry superheated air now so commonly employed in various diseases, especially in certain cases of rheumatism and arthritis deformans, copper cylinders lined with asbestos are commonly employed. These are of various shapes and sizes, being large enough to admit the whole body or a part, such as an arm or a leg.

Local baths and *packs* are used chiefly to relieve inflammation. Thus for sprains a foot-bath, in pelvic inflammations —for pain, or to induce menstrual discharge—a sitz-bath is frequently ordered. In the latter the patient occupies the sitting position and only the thighs and part of the trunk are immersed, while the upper part of the body and the feet are protected with blankets. These baths are given in tubs specially shaped for the purpose.

A salt-water bath is ordered for its tonic effects. It can scarcely take the place of sea-bathing, but where this is not obtainable or where for some reason or other it is contraindicated, the following will be found a good substitute: Salt may be mixed with the ordinary bath-water in the proportion of from 9 to 14 pounds of sea salt to 50 gallons of water; such a bath will be strong enough to redden the skin and will generally have an exhilarating effect.

For certain forms of skin disease, *starch, bran, or alkaline baths* may be ordered to allay irritation. The *starch bath* is made by adding eight ounces of laundry starch to each gallon of water. For the *bran bath* the

bran is put in a bag which is allowed to soak in warm water for an hour before being used, or it may be boiled for a quarter of an hour and then the fluid drained off and added to the bath water. Medicated baths other than these—with the possible exception of the so-called Schott baths—rarely come within the province of a nurse in private practice, as anything like satisfactory results from them can be obtained only in sanitaria or hydrotherapeutic institutions fitted up with all the proper appliances, where the whole course of treatment is systematically taught and carefully supervised.

For the local *chest-pack* used in pleuritic and other conditions, a piece of flannel two yards long and three-quarters of a yard wide is folded lengthwise and rolled, dipped in either hot or cold water, wrung out as dry as possible and applied to the chest in the form of a figure-of-eight bandage, being passed across the chest from the left armpit over the opposite shoulder, across the back under the left arm, across the chest under the right arm, round the back and over the left shoulder, and fastened with a safety pin. Over this is put on a double pneumonia jacket covered with oiled silk. After the removal of the pack the skin is rubbed with 50 per cent. alcohol.

Baths and packs are also employed in functional nervous disorders for their tonic or sedative effects. For the latter warmth is used, as it relaxes the nervous tension and promotes quiet and sleep, whereas cold tends to increase the circulation, stimulate nervous action and give tone to the muscles. When a sedative effect is desired quiet is necessary and no stimulation is

indicated. Cold baths or packs may advantageously be followed by massage or other exercise.

The *warm pack* is sometimes ordered for nervousness or sleeplessness and is often useful in chorea. A single blanket is put to soak in hot water. The bed is then prepared with a long rubber sheet covered by a single dry blanket upon which the patient is laid. The blanket is then wrung as dry as possible out of the hot water and wrapped about the patient up to the neck. In the case of children the arms should be folded across the chest and enclosed in the blanket. Over all comes a dry blanket. Care must be taken that the blanket is not hot enough to burn the patient; but at the same time it must not be too cool. After twenty minutes the patient is taken out, rubbed dry gently, given a drink of water and left to rest.

The same result is sometimes obtained by means of the *spinal hot sponge bath.* The patient having been made comfortable, a sponge wrung out of hot water is applied with long even strokes along the spine which has been left bare. The procedure lasts for fifteen to twenty minutes after which the patient usually drops off to sleep.

The *cold pack* is also sometimes ordered in conditions of delirium, of extreme nervousness, and to induce sleep. In such cases one sheet only is required. This is wrung out of cold water, and the patient wrapped in it, the feet being left free. She is then enveloped loosely in blankets, and allowed to remain for from twenty minutes to an hour. If the feet are cold a hot can may be put to them. Where symptoms of delirium are present an ice-cap or wet compresses made

of gauze must be kept constantly applied to the head; in many other cases they are a source of comfort.

The *drip-sheet bath* is used largely in the rest-cure treatment. In a properly warmed room the patient stands in a tub containing tepid water a few inches deep; a sheet is dipped in this water and while dripping is wrapped quickly about the patient from behind, each limb being encased in it. Rapid friction is then made by the nurse who stands at one side of the patient, and rubs briskly the back and front at the same time, and afterwards the sides and extremities. If the patient reacts quickly cold water may be thrown over the body and the rubbing repeated. The sheet is then taken off, and the patient after being rubbed down with warm towels, is put to bed. The feet are massaged and if necessary a hot-water bag is applied. If the patient is up and about she may be warmly dressed and sent out for further exercise. The whole bath should be over in from three to five minutes.

A favorite method of applying shock to the nervous system is by the *cold douche,* either local or general. It should be given with considerable force, very quickly, the sensitive part being treated last.

The cold sponge bath, the cold pack, and the cold water tub-bath are employed chiefly for the reduction of temperature in typhoid fever, and occasionally in pneumonia or other acute infectious diseases.

In giving a sponge-bath to reduce temperature the nurse should disturb the patient as little as possible; if the bathing has to be repeated often, the continual moving irritates a typhoid patient and may aggravate the nervous symptoms. It is not absolutely necessary to turn him over and spread a long rubber sheet un-

der him, the only object being to protect the bed from any moisture, and this can be done by means of two large bath towels or a small draw-sheet. In preparing to give a sponge bath there should be ready (1) a rubber sheet or two large towels to protect the bed; (2) a towel of medium size for spreading over the abdomen; (3) two small ones as compresses for the head (or an ice-cap); (4) two medium-sized sea-sponges; (5) two basins, one for the towels and compresses, the other for ice-water; (6) a rubber to protect the pillow. A wet compress is kept on the head all the time. Whenever the compress becomes at all warm, it should at once be changed for a second, which has been put on ice ready for the purpose. As a rule the temperature of the water is regulated by the amount of fever present. The higher the fever, the cooler should be the water. A steady temperature of about 65° F. can be maintained by using lumps of ice. A foot-bath tub is the best kind of basin, as its use obviates the necessity of changing the water. The patient is covered with a sheet, and the body is gone over in sections just as in the bath for cleanliness: the sponging, beginning with the face and neck, proceeds to the arms; it should be done with long light downward strokes, as the object is to bring the water in contact with the body without producing friction. The sponge is changed after every third or fourth stroke. After the arms, the chest and abdomen, and the legs and feet, are taken, but before going on to these a wet towel is wrung out and spread over the chest and abdomen. This should be changed frequently. Finally, the patient is turned over on one side with the towels tucked in, so that the back

may be sponged; if very weak she can be supported with one hand while the other is used for bathing. The exposure of the parts being bathed to the air assists evaporation, and hence materially aids in the lowering of the temperature, and it is also better not to rub the patient dry. Five minutes' time is given to each section, the parts where large blood-vessels are near the surface being sponged longest. Pieces of ice wrapped in a cloth and laid in the axillary spaces and along the carotid arteries are often useful. The legs from the knees down require less sponging since they usually cool quickly. The whole bath occupies about twenty minutes. The patient is now turned on her back, a gown open all the way down behind, but closed in front, is slipped on, and the temperature taken. The patient should be encouraged to drink plenty of cold water during the bath.

Fever can also be reduced by means of evaporation alone. For this purpose towels or gauze wrung out of tepid water are spread over the patient's body and she is then exposed to the air, and fanned, the towels being changed once or twice during the treatment, which should last about 20 minutes.

The simplest way to apply the *cold pack* to reduce temperature is as follows: A long rubber sheet having been put on the bed and covered with a blanket, two sheets are taken, and folded separately lengthwise into four thicknesses. They are then wrung out of cold water at 60° F. or 65° F., and placed one under the other over the patient, being tucked snugly in about the neck, under the arms and sides, and carried down to the ankles. The sheets are removed at the end of fifteen minutes and the procedure is repeated.

It requires four such packs of fifteen minutes each to equal one bath of ten minutes, but in spite of this the pack is sometimes preferable, and is more particularly suitable for children.

An *affusion* to reduce temperature may be given by wrapping the patient in a sheet and placing him on a canvas cot, and then sprinkling him with water from an ordinary watering-pot. The procedure may also be carried out with the patient in bed by elevating the head of the bed, protecting the mattress with two long rubber blankets, the second being allowed to hang over the foot of the bed so that the water drains into a pan. At first the sprinkling is done with tepid water, but by degrees cold water is substituted. A towel should be spread over the chest and loins. A collapsible rubber bath-tub is now obtainable which takes the place of the above contrivances; its use affords a great saving of strength to both patient and nurse.

Tubbing the patient is an excellent way to reduce temperature. This method, introduced by Brand, whose name it bears, was used by him with extraordinary results, which have been confirmed by the experience in our best American hospitals. Where it is used, a temperature of 102.5° F. is generally an indication for the bath. A portable tub is necessary. This is filled two-thirds full of water at a temperature of 85° F. and rolled to the bedside. The nightgown having been removed, the patient is wrapped in a sheet and lifted in, the feet being immersed first, and the body gradually lowered until it is completely covered. The hands remain free, as the pulse must be watched. A ledge at the head of

the bath has a rubber pillow or ring on it, upon which the head, covered with a cold wet compress (towel or sponge), rests. The temperature of the water is gradually reduced until it reaches 75° or 70° F., the desired point being maintained by adding ice from time to time. After the bath is finished a dry sheet is spread over the tub, in which the patient, freed from the wet one, is wrapped as she is lifted out. She is then placed on a long rubber sheet on the bed and covered with a single blanket. In about ten minutes the wet clothing is removed and she is wiped dry. The rectal temperature is to be taken at once, and again three-quarters of an hour later. For the nervous tremor or blueness (the latter especially being not infrequent) during the bath continuous friction should be applied to all parts of the body except the abdomen. Either the hand or a long-handled flesh-brush covered with flannel may be used for this purpose. When in bed, if the shivering should continue, the patient should not be covered with a number of blankets, but a hot can should be placed at the feet and the friction continued, the rubbing being always towards the heart, and any stimulants or nourishment that may have been ordered should be given. Some patients find a temperature of 85° F. too cold and the shock too great, in which case one may start with water about 95° F. and then gradually reduce the temperature to 75° or 70° F. by adding ice. The average duration of such a bath is also from fifteen to twenty minutes: the first one should last only about ten minutes, so that the patient may become accustomed to the treatment. The nurse who has never seen such a bath given before may be alarmed by the con-

dition of the pulse, which becomes hard and small, but this is due to the contraction of the superficial blood-vessels, with consequent increase in the arterial tension, and is not serious. A soft intermittent pulse is a different matter, and is a danger signal; the patient should be removed at once to the bed, hot water bottles should be placed around her, stimulants should be given and friction employed. Old people and children usually need baths at the higher temperatures as they do not stand intense cold well.

The advantages of a cold bath are: (1) its antipyretic effect; (2) its quieting effect on the nerve-centers, whereby delirious symptoms are frequently checked and sleep is induced; (3) the modification of the circulation, shown by the slower and stronger pulse; (4) the increased excretion from the body of poisonous products. Statistics show that this treatment has greatly reduced the mortality in typhoid fever, and the same is probably true for other febrile disorders. The increased frequency of breathing which ensues when the patient is first immersed gives more oxygen to the lungs and aids in the propulsion of blood through them. Hæmorrhage from the bowels, peritonitis and cardiac failure are regarded by many physicians as contraindications to its use.

In afebrile cases the cold bath is sometimes ordered to stimulate the circulation or for its effect on the nervous system; it should then be given in the morning and should not last over five minutes. The patient is to be vigorously rubbed immediately after it, and if reaction does not set in warm drinks should be given, external heat applied, and the friction continued.

As accuracy is an important feature, there should

be a bath thermometer to test the temperature of the water, as one cannot trust implicitly to the subjective sensation of touch.

The *continuous surgical bath* is used in certain cases of large suppurating wounds, in extensive skin lesions, as from burns, after operations upon the bladder in which supra-pubic drainage is employed, and in some rectal cases. The patient's whole body is immersed in water, kept clean and at a uniform body temperature. This can be best arranged where a perpetual flow through the tub can be obtained; where this is impossible, warm water must be added at frequent intervals, the bath thermometer being carefully watched. The dressings are removed, and a short nightshirt having been put on, the patient is suspended as in a hammock on strips of canvas fastened to the sides of the tub; the head and back are supported by rubber water pillows. In order to keep the temperature more uniform and to restrict evaporation, the tub is covered with a rubber blanket (with the rubber downward) supported on a framework of slats. If any dressing or irrigation of the bladder is needed, the hammock is slightly raised until the necessary portions of the body are exposed and the manipulations can then be carried on without taking the patient from the tub. If carefully looked to, the patient finds such a bath very comfortable and sleeps and eats as usual. Every morning and evening he is lifted out and dried; before he is returned to the tub he is given the usual daily bath and the parts to be immersed are anointed with lanolin. Every precaution must be taken to protect the patient from any sudden chilling. If necessary the bowels may

be opened at this time by means of an enema. Before the patient is returned to it the bath-tub is thoroughly cleaned.

The continuous bath is also applicable to a single limb or part of a limb. For this purpose a foot-tub or a bowl (filled with water or with various solutions) of suitable size may be employed.

In hospitals for the insane maniacal patients are often kept for hours or days in a warm bath. This procedure often exerts a remarkable sedative influence and in appropriate cases is much better than the employment of drugs.

CHAPTER VIII.

ENEMATA.—KINDS.—METHODS OF PREPARATION.—FREQUENCY AND MODES OF ADMINISTRATION.—CARE OF APPLIANCES.—DOUCHES.—CATHETERIZATION.—LAVAGE OF THE BLADDER.

There are various methods employed for injecting fluids into the body. When they are introduced into the intestines through the rectum, we speak of giving *enemata* (singular *enema,* with the accent on the first syllable). Since the purpose for which they are used are manifold, there are many different kinds of enemata.

A convenient classification is as follows:

1. Simple, laxative, and purgative enemata.
2. Nutritive enemata for the introduction of nourishment.
3. Sedative enemata for local or systemic effects.
4. Astringent enemata which check hæmorrhages and diarrhœas; *e. g.* hot water or ice water, solutions of alum or of nitrate of silver.
5. Emollient enemata for soothing irritated and painful mucous membranes: starch and certain drugs are used for this purpose.
6. Antispasmodic enemata to relieve flatulence—*e. g.* the turpentine enema.
7. Anthelmintic enemata for destroying worms: salt, turpentine, and quassia are used in this way.
8. Antiseptic or germicidal enemata, used in the various forms of dysentery.

9. Stimulating enemata—*e. g.* hot water, hot coffee, hot whiskey and water, salt and water.

10. To relieve thirst—water, Oj, or normal salt solution, given high.

GENERAL DIRECTIONS FOR GIVING AN ENEMA.

The patient is placed on her left side with the knees flexed, since the sigmoid flexure of the colon lies in the left iliac fossa, and the fluid will thus be more easily retained; the bed is to be protected with a rubber sheet and a towel. The bed-pan should be ready and under these and all other circumstances should always be given to the patient comfortably warm. In very obstinate cases of constipation the knee-chest position is ordered, but this is rarely necessary. The basin of water is placed on the rubber sheet and the enema administered under cover.

For a *simple enema* the amount for an adult varies from one to four pints, for a child from a half to one pint, and for an infant about two ounces are sufficient. The best time to administer a simple enema is in the morning just before beginning the toilet.

To give a simple enema ordinary suds are made with castile or good brown soap and water, the temperature of which should be about 95° F. when ready for use. A bulb syringe is used, care being taken to fill it to the nozzle before introducing the latter into the rectum, since any air left in the syringe will pass into the intestines and may cause pain. The bulb syringe is better than any other form, as a certain amount of intermittent gentle pressure, which is necessary, can best be obtained in this way. The nozzle is always oiled or vaselined before introduction, as the soapy water will

not lubricate it sufficiently. Forcible insertion of the nozzle is to be avoided, and one must be careful to pass it in, following the natural curve of the rectum, for a distance of two or three inches. If the point of the nozzle should meet with any obstruction, no attempt should be made to force it in, as the impediment is either the wall of the rectum or an accumulation of fæcal matter, which will have to be removed before proceeding further. The water is to be introduced slowly in a gentle and steady stream. The main object is to distend the rectum by means of the water sufficiently to produce reflex stimulation, thus increasing the peristaltic action and as a result bringing about a complete evacuation of the contents of the lower bowel. If rapidly and spasmodically injected, there will probably be pain and an intense desire for immediate rejection. After the full quantity has been given, the patient should try to retain it for ten or fifteen minutes in order to obtain satisfactory results. A folded towel placed against the anus will assist the patient in resisting the desire to expel the intestinal contents.

If one simple enema is not effectual, the procedure should be repeated in half an hour, a larger amount being given. Sometimes, after operations or where the action of the bowels has been sluggish, a laxative injection instead of a simple enema is given; or the laxative enema is followed by a simple enema in the course of half an hour. The laxatives ordinarily used are warm olive oil or glycerine, the former softening the fæces, the latter increasing the peristaltic action. If olive oil is ordered, the average amount is six ounces in a hard-rubber syringe; a simple oil enema is seldom

successful unless followed by the soapsuds, which should be given half an hour or an hour later. To give a glycerine enema, half an ounce of glycerine is mixed with the same amount of water at a temperature of 95° F. and given with a hard-rubber syringe. It is rarely necessary to inject warm water afterwards, since the glycerine and water usually prove effectual. Sometimes, however, it becomes necessary to repeat the injection in an hour. In mild cases from half a drachm to one drachm of glycerine is enough, and for children and infants the contents of a straight medicine-dropper will prove effectual. Glycerine is irritating to the skin and mucous membranes of some people, producing a sharp, burning sensation. These unpleasant effects can be modified by adding equal parts of olive oil. When laxatives *per rectum* fail, purgative enemata are resorted to. These are made by adding drugs, such as turpentine with Epsom or Rochelle salts, or castor oil, in certain proportions to the simple enema. In giving castor oil and water it is necessary first to make an emulsion by mixing the oil with the yolk of an egg and shaking well; the warm soapsuds are then added.

Formula 1.

Castor oil, ℥ij;
Turpentine, ℥ss.

Mix, and introduce with a hard-rubber syringe, following, in half an hour, with a quart of soapsuds.

Formula 2.

Turpentine, ℥ss;
Rochelle or Epsom salts, ℥j;
Mix with warm soapsuds, Oj.

The Rochelle salts are the better, as they dissolve quickly. Sometimes it is necessary to introduce the oil or glycerine high up. To do this a rectal tube or a rubber male catheter is attached to the end of the syringe, and passed up the rectum for six or eight inches.

Of the various enemata above described, undoubtedly that with the half ounce of glycerine gives the best results in ordinary cases, but for very obstinate constipation or after an operation, where it is imperative that the bowels shall not be obstructed, the turpentine and Rochelle salts are the best. After turpentine has been used the buttocks and anus must always be washed off with warm water.

Nutritive enemata, as the name implies, are intended to nourish the body, and are given when food cannot be retained by the stomach, when it is necessary to allow that organ to rest, or where the system requires more nourishment than can be given by the mouth. They should not be given oftener than once in four hours or six times in the twenty-four hours, and the quantity administered at any one time should not exceed four ounces; the frequency and amount are, however, generally regulated by the physician according to the nature of the case.

A nutritive injection should never be given just within the rectum, as may be done with an ordinary enema. Absorption by the mucous membrane of the large intestine goes on slowly, much more so than in the small intestine, where this process normally takes place. Moreover, the absorptive power of the rectum is less than that of any other portion of the large intestine. Thus we shall not uncommonly find that

a part at least of a nutritive enema may lie unabsorbed, and as it decomposes cause irritation of the mucous membrane, until a second one is given, when a portion of both will probably be rejected. This kind of enema, therefore, should always be introduced as high up as possible, about ten inches, and for this reason should be given through a rectal tube made of heavy rubber about a quarter of an inch in diameter, of which at least eight inches should be inserted into the bowel. This thickness will be sufficient to prevent the tube from coiling up on the inside, as very often happens where one of soft rubber is used. The tube, however, must not be so stiff as to endanger the integrity of the walls of the intestine when moderate force is used in introducing it. After being well oiled the tube is gently inserted in a backward and upward direction, and to the outer end a small glass funnel is attached. The enema, having been previously mixed in a small pitcher, is poured very gently and very slowly into the funnel, which is then elevated, so that the contents will trickle through the tube. In this way no air is introduced. A folded towel should be slipped under the patient to catch any drops and to receive the tube when withdrawn. After each time the tube is to be washed out thoroughly by allowing warm water to run through it, and should then be kept in a solution of boric acid. To prevent irritation of the mucous membrane where the enemata are to be given for any length of time, it is well to irrigate on each occasion with simple warm water, or a weak solution of boric acid, using the tube in the same way as for an enema, and then lowering it so as to allow the water to run out. This precaution

will enable us also to make sure that the bowel is empty before giving a nutritive enema. Food given in this way should be very nourishing, and concentrated substances, such as extracts of beef, beef-juice, eggs, and milk, are generally used, stimulants of some kind being often added. Two excellent formulæ are

1. One whole egg;
   Table salt, grs. xv;
   Peptonized milk, ℥iij;
   Brandy, ℥ss.

Or 2. The whites of two eggs;
   Peptonized milk, ℥ij.

The whole amount should never exceed four ounces. The addition of the salt aids in the absorption of the egg.

Brandy and whiskey are very irritating and should be given only every other time, unless especially ordered; if omitted, the quantity may be made up by adding another ounce of milk. For stimulating enemata the brandy or whiskey is best given in strained barley water. The milk should always be peptonized, and can be rendered so by adding twenty grains of Fairchild's prepared pepsin to one pint of milk. The vessel containing this is allowed to stand for fifteen minutes in water at a temperature of 100° F., and afterwards placed immediately on ice.

The pure beef juice is given in quantities of from an ounce to an ounce and a half twice in twenty-four hours; four ounces of beef-essence may be given and repeated once. After a nutritive enema the patient should be kept quiet on her back for twenty or thirty minutes.

Rectal Medication. Sedative medicines are sometimes given by the rectum. Among these the bromides and chloral are administered for their systemic effects, and opium in some form more especially where there is localized pain. These drugs should always be given with the tube inserted at least six inches.

In shock or collapse four ounces of strong coffee or brandy and a liter of hot water or normal salt solution to which have been added thirty grains of ammonium carbonate, are often given high up. A small pillow placed beneath the hips will help the flow upward.

Rectal injections of normal salt solution have come to be an accepted form of treatment in many diseases. After major operations a liter of warm normal salt solution is usually given before the patient is taken off the table. They are often employed in sunstroke and shock, as a stimulant and for blood depletion after hæmorrhages. In acute nephritis they may be given slowly drop by drop, the tube of the syringe being clamped not too tightly. These injections act as a stimulant to the kidneys and counteract the effect of uremic poisons. For flushing the colon with normal salt solution, from two to four liters at a temperature of 110° F. are given with a fountain syringe, the whole amount of fluid being introduced and then siphoned off. In rectal irrigations a double rectal tube should be used to permit the entrance and outflow of water.

In hæmorrhage from the bowels hot-water or ice-water injections may be ordered. These are best given with a fountain syringe the tubing of which is attached to the rectal tube by means of a glass pipette,

The bag can be hung up, but not high enough to produce any great force, the flow of water being regulated by the pressure of the fingers on the tube. If necessary the bag may be refilled as soon as it is empty. For a patient suffering from peritonitis the injections are given in the same way, plain water being used with absolutely no force. This is the most convenient method also where astringents, such as nitrate of silver and alum, are dissolved in large quantities of water for irrigation of the intestines in dysentery.

For ether patients the enema should be given never less than two hours, usually three, before the operation, particularly in operations for hæmorrhoids and in gynæcological work.

A rash not unlike that of scarlet fever and associated with some degree of irritation may follow the frequent giving of enemata. It may appear on different parts of the body but usually about the trunk and on the limbs. It disappears in a day or two. A local bath of bicarbonate of soda will allay the itching.

Emollient enemata are prescribed in diarrhœas and dysentery; where there is much tenesmus, probably the best is that made of starch and opium. The starch is bland and unirritating, while the opium soothes the pain, not only by lessening peristalsis, but also by direct action on the end nerves. In the diarrhœas of children more particularly, it gives excellent results, but the action of the laudanum must be closely watched. To prepare a starch enema one takes a sufficient quantity of laundry starch, and adds enough cold water to dissolve it; then boiling water is poured on until a thin paste is formed which is free from lumps. After this has been well cooked

and has become cold the exact quantity ordered (usually two ounces) is taken, and into it are stirred the required number of drops of laudanum. The injection is given slowly and gently through a small rectal tube.

Turpentine enemata for distension may be given according to the following formulæ:

> Mucilage of acacia, ℥ss;
> Spirits of turpentine, gtt.x.
> To be administered high up.

Nurses should be most particular about the care they take of the appliances employed in giving enemata. These should always be thoroughly cleaned before being put away, and this can best be done by allowing first hot soapsuds, and afterwards simple hot water, to run through the tube. The tube should always be boiled before being used on another patient. It should never be put away damp, but hung up lengthwise to drip and dry. The nozzle is to be left for some hours in a 5 per cent. solution of carbolic acid, and then well washed off and boiled before being used again.

By a *douche* is generally meant a jet of fluid directed with a certain amount of force upon a limited surface, external or internal. Among those given internally are the vaginal, the nasal, and the aural douche. Douches are given for cleanliness, for their stimulating effects, or to relieve inflammation; like other baths, they may be either simple or medicated The vaginal douche is very frequently used in hospitals, and is usually made by adding some disinfectant to the water. For cleansing purposes, a 1 per cent solution of carbolic acid is often ordered; to allay

inflammation, a hot solution of the same strength, the temperature ranging from 105° to 115° F. or even higher, can be employed. The fountain syringe with a glass douche-nozzle attached is the best instrument to use. Before the nozzle is inserted the stream of water should be allowed to flow through it until it is warm, and it should then be introduced up toward the posterior wall of the vagina. The bag should never be more than from six to twelve inches above the recumbent patient, so as to avoid any pressure that might force the water into the uterus, the mouth of which after labor and in many pelvic disorders is dilated. The low pressure is also desirable as the flow is slower and the parts are kept longer in a hot bath. If no special amount is ordered, a quart or three pints will be enough. The douche should always be given with the patient in the recumbent position; even if she be up and about, she should be made to lie down for such treatment. The continuous vaginal douche is sometimes ordered where much inflammation exists. A small bi-valve speculum is introduced into the vagina and is opened and adjusted when about half way up the cavity. Around the glass douche nozzle enough absorbent cotton is wrapped to hold it in place inside the speculum. Hot salt solution is usually ordered. The douching may be continued an hour or more, and should be given under low pressure. Glass nozzles are the only ones that can be kept quite clean, and they should be of the simplest possible construction. After being used hot water is allowed to run through them, and they are kept in a small open-mouthed bottle filled with 1:20 carbolic-acid solution, with the patient's name

on the label. Each patient in the hospital requiring douches should have her own douche-nozzle. Before being used for another patient the nozzle is to be washed thoroughly with soap and cold water and boiled for five minutes in a 1 per cent. solution of carbonate of soda.

Besides being used for giving high enemata the rectal tube is sometimes inserted in order to allow the escape of gas from the bowel. In these cases the outer end should always be immersed in a basin containing a solution of carbolic acid. When gas escapes it will be noticed bubbling through the fluid.

Catheterization.—As it is important for a nurse to know early in her training how to catheterize a patient, the subject will be discussed here. Cystitis is an inflammation of the mucous membrane lining the bladder, which may be due to many different causes. One of the prolific sources of this inflammation is the introduction of foreign material into the bladder on a catheter. If germs are introduced, the urine will be decomposed, more germs will be developed, and inflammation will result. When this is the case, the fault lies with the doctor or nurse, in most cases with the latter, since she is usually entrusted with the work. To avoid this, therefore, every nurse should make sure, when an order has been given her to catheterize a patient, that a cystitis, if such unfortunately should occur, will not be traceable to any neglect on her part; otherwise she may feel that she has been the cause of weeks or months of intense suffering to a patient through her carelessness. Let her, then, see that the utmost cleanliness is exercised. The glass catheter is by far the best for women, but, of

whatever material it be made, the instrument should be absolutely clean. The glass, metallic, or rubber catheter may be rendered thoroughly sterile by first washing with soap and cold water and then boiling in a 1 per cent. solution of carbonate of soda for five minutes; it is then laid in a clean basin containing a warm solution of boric acid, where it remains until it is needed. A gum-elastic catheter should be soaked for one hour in a 1:1000 bichloride solution, then washed off thoroughly in hot sterile water, and placed in the boric-acid solution.

In preparing to catheterize a patient the nurse is to wash her hands with soap and hot water, and afterward soak them in a 1:1000 bichloride solution. She then takes sterilized gauze sponges, forceps, the basin with the boric solution and catheter, a vessel to receive the urine, and some sterilized oil. The patient lies flat on the hips with the knees somewhat separated; a sheet or blanket is next thrown over each knee, leaving the vulva exposed; this is necessary, as one must see that the parts are clean. In bathing, gauze sponges should be used to separate the labia, and the region of the meatus urinarius should be carefully washed off with pledgets of gauze held in the forceps and soaked in the boric-acid solution. The catheter is then lifted with the forceps and the nurse, holding it by its outer end, introduces it into the urethra, taking care to touch with her hands only the portion which will be left outside. With a glass catheter no oil is necessary.

The urethra is situated just above the vaginal outlet, and as a rule can be easily seen: the end of the catheter should enter the bladder quite readily. If

any obstruction be met with, the instrument should not be pushed forward, but withdrawn slightly and its course changed. If the urine ceases to flow, the catheter is to be withdrawn a little or the position changed, when it may flow again. If the bladder is very much distended, it should not be emptied entirely the first time. When removing the catheter the finger should be placed over the end, so that any drops of urine remaining in it may not fall upon the bed. After the urine has been drawn off the parts are bathed and dried. Hot water is passed freely and with some force through the catheter. Glass catheters may be boiled in soda solution, and then kept in a 5 per cent solution of carbolic acid. The others, after being thoroughly washed and dried, are laid aside, folded in a clean towel, and must be sterilized in the manner described above before being used again.

If a specimen of urine be required for examination, it should be drawn directly into a sterilized bottle, the top of which is to be plugged with clean cotton. Otherwise a patient should not be catheterized unless absolutely necessary.

For *irrigations of the bladder* various solutions are ordered. The warm solution is poured into a sterilized rubber bag or fountain syringe. The catheter having been introduced and the urine drawn off, the end of the conduit tube from the bag is attached to the end of the catheter and the solution is allowed to run slowly into the bladder, the stream being controlled by pinching the tube. After about two hundred cubic centimetres have run in, or sooner if the patient complains of pain, the tube is disconnected from the end of the cathe-

ter and the bladder allowed to empty itself. The process may be repeated several times, until the washings are clear. If desired a two-way catheter may be employed, especially if the distention of the bladder is at all painful.

A very simple and convenient apparatus consists of a glass funnel with rubber tubing connecting it with a glass catheter. All these articles can be sterilized by boiling in a 1 per cent. solution of sodium carbonate. After the urine has been drawn off, the air is expelled from the tube by allowing a small amount of the solution to pass through it; the solution is slowly poured into the funnel and passes into the bladder which is gradually distended. The funnel is then inverted below the edge of the table and the fluid is siphoned out. This procedure is repeated several times. As now practised in some hospitals the process is very simple, a silver "two-way" catheter being used. It is shaped somewhat like the letter "y"—the long arm for insertion into the bladder, and the upper arm attached to the tubing of the bag, so that they are connected and boiled together. The channel of the catheter is divided lengthwise, and has two holes near the inserted end, so that the irrigating fluid flows in through the upper short arm and one side, and returns by way of the other side and the lower short arm. In this way a continuous irrigation is kept up with no necessity for interrupting the flow.

CHAPTER IX.

TEMPERATURE.—PULSE.—RESPIRATION.—CARE OF THE THERMOMETER.—CHARTING AND RECORDING NOTES.

The temperature, pulse and respiration in health bear a certain ratio to one another, and any variation in one will usually be found associated with changes in one or both of the others. Thus it becomes necessary, when considering the condition of one, to bear in mind at the same time that of the other two. A knowledge of the functions of the skin, of the circulation of the blood, and of the chemical changes that take place in the body and produce heat, is necessary for a full comprehension of the establishment and maintenance of the bodily temperature, by which we mean the degree of heat found in any part of the body. This is nearly equal everywhere, since the blood which penetrates all portions of the system has for one of its functions the general distribution of the heat. In health the temperature varies constantly within certain narrow limits, although a normal temperature by no means indicates that a person is free from disease. The normal temperature of the human body is 98.6° F. (37° C.), but under certain circumstances may be anything between 97.5° and 99.5° F. A temperature above or below these points is to be considered abnormal, that is, as denoting a departure from that of the normal or healthy condition. The normal variations may be classed under three different headings:

First: those dependent upon the time of day at which the temperature is taken, as definite daily changes take place within the limits mentioned above. During the greater part of the day about the mean temperature of 98.6° F. is maintained, but by four or five o'clock in the afternoon this is found to have increased to 99° F., or may even be a little higher; at eight o'clock in the evening the fall begins, which continues until the lowest point, 98° or 97.5° F., is reached by 2 A. M. The temperature may continue low until between six and seven o'clock, when it again rises to 98.6° F. These fluctuations are easily accounted for, since during the day food and exercise tend to gradually elevate the temperature slightly, while after eight o'clock in the evening, when there is rest of body and mind and the hours are passed in fasting and sleep, there is naturally a slight decrease. In young children and the aged the diurnal variation is greater than in adults.

Secondly: those dependent on the part of the body in which the temperature is taken; thus the temperature in the axilla is always lower than that of the mouth by three-tenths of a degree, while that taken by the rectum is half a degree higher than that taken in the mouth.

Thirdly: those dependent on other causes. Thus the ingestion of highly-seasoned, stimulating foods elevates the temperature. Again, certain general or local causes may exercise a decided influence on the heat of the whole or of certain parts of the body; for instance, profuse perspiration reduces temperature, or if the hands and arms are dipped in cold water, while

the axillary temperature may be subnormal, that taken by the mouth may give a normal reading.

Any departure from the normal temperature, beyond certain limits, indicates a deviation from health or the invasion of disease, and in many instances the intensity of the morbid process is directly proportionate to the elevation of the temperature.

Abnormal temperatures are recognized as (1) subnormal, (2) elevated. A subnormal temperature may range from 96° to 98° F. In conditions of collapse it may go as low as 95° F., but this is extreme, and there is little hope of a patient rallying with such a temperature. A general depression of the vital forces may produce a subnormal temperature, or local causes—*e. g.* traumatism by producing shock—may have a similar effect. In paralysis, after severe hæmorrhage, in some diseases where there is a continual tissue-waste going on, in chronic malaria where the blood has been much impoverished by the malarial organism, in some nervous disorders, and in certain poisonings that affect the heat centres and in heat exhaustion,—in any of these conditions there may be a subnormal temperature.

An elevation of temperature means excess of heat in the body, due either to an increased production or to an over-accumulation from imperfect dissipation.

The range of temperature compatible with life may be fairly placed between 95° and 109° F., either of these extremes usually being a fatal symptom. In some extraordinary cases, however, in which there were remarkably high or low temperatures, recovery has ultimately taken place. We may then classify the temperature conditions as follows:

Temperature of collapse	95°-97° F.
Subnormal temperature	97°-98° F.
Normal "	98.6° F., with variations.
Subfebrile "	99.5°-100.5° F.
Fever of moderate degree	100.5°-103° F.
High fever	103°-105° F.
Hyperpyrexia	above 105° F.

The temperature should be taken at least twice a day, owing to the diurnal variations; thus, a morning temperature may be normal, while the evening temperature may be considerably elevated. The instrument for measuring the heat of the body is called a clinical thermometer, to distinguish it from the ordinary instruments. The Fahrenheit scale is the one principally used in America and England, but the index range extends only from 95° to 110°; each degree is divided into five equal parts, each of which represents two-tenths of a degree. The normal point is marked by an arrow. On the continent of Europe the Centigrade and Réaumur scales take precedence.

The rule for converting Fahrenheit into Centigrade degrees is to subtract 32, multiply by 5, and divide by 9. For instance,

$$104^\circ F. = \left[(104^\circ - 32^\circ) \times \frac{5}{9}\right] C. = 40^\circ C.$$

To reduce Centigrade to Fahrenheit multiply by 9, divide by 5, and add 32 to the result.

$$\text{Thus, } 40^\circ C. = \left[(40^\circ \times \frac{9}{5}) + 32^\circ\right] F. = 104^\circ F.$$

To reduce Fahrenheit to Réaumur subtract 32, multiply by 4, and divide by 9.

The instrument should be accurate, self-registering, and clearly indexed. A Hicks' thermometer, with a

Kew Observatory certificate, is very good. but all thermometers change with age, and should be tested by a standard frequently and the necessary corrections made. The best way to test a thermometer is to place it, along with one of known accuracy at the same moment, in the mouth or rectum. After these two have been left long enough to register, they are taken out together and the results compared. Before being inserted the mercury should be shaken down below 95° F. on the index. The temperature may be taken cutaneously between two folds of the skin in the axilla or groin, or in some of the cavities of the body, the mouth, vagina or rectum. The length of time necessary for obtaining the registration depends upon where the temperature is taken and upon the thermometer used. None register under three minutes except the special one-minute thermometer, which is too expensive for hospital use and not always trustworthy. The time allowed for registration in the mouth or rectum is from three to five minutes. The axillary temperature will be from one-tenth to three-tenths of a degree lower than that taken by the mouth.

The rectal temperature is the most accurate, as by this method the patient is not required to assist; indeed, for children it is the only one reliable. Precautions must be taken to have the rectum free from fæces. The bulb of the instrument is to be oiled and inserted gently for about one and a half inches: to prevent accidents the nurse usually holds the stem. The only disadvantage lies in the inconvenience of the procedure, unless indeed there be any disease of the parts, since an elevation might then be due merely to local causes.

For obvious reasons, however, the temperature is most commonly taken by the mouth. The thermometer should be placed under the tongue, the patient being instructed to breath through the nose, to keep the lips tightly closed over the instrument, but not to bite it. If the lips be dry, they should be moistened, but one should be careful not to take the mouth temperature directly after a hot or cold drink. If a patient is too weak, or the lips and mouth are so dry that they cannot be kept tightly closed, air will be admitted and the record will be inaccurate. Moreover, the method is not a safe one for very dull, unconscious or delirious patients, since they may bite off the bulb and swallow it. Should this accident happen, it should be reported at once to the physician, though as a matter of fact he can do nothing, and the results are not likely to be serious. In several cases which I myself have seen, and which were left to nature, no harm resulted.

In taking the axillary temperature the arm-pit should be wiped thoroughly dry from perspiration and the thermometer placed in the hollow: the arm is then held closely to the side with the elbow flexed and the hand resting on the opposite clavicle. If the patient is very weak the arm should be held in place by the nurse. Sometimes there is too much emaciation to admit of the close contact of the skin surfaces: in such cases or where there is excessive perspiration an axillary temperature should not be relied upon. The method is convenient at night, since it can be practised with but little disturbance to a sleeping patient, whereas if the temperature is taken by mouth when half asleep he is liable to allow the lips to open. In re-

cording a temperature one always states where it has been taken. The temperature should not be taken just after any exertion or after a bath, unless the latter has been given for fever.

Before using the same thermometer for another patient the nurse should be particular to soak it for three minutes in a 1:1000 bichloride solution and rinse it off in clean water. When thermometers are not in use they should be kept in a glass filled with a fresh solution of bichloride of mercury (1:1000), the bottom of which is covered with absorbent cotton as a soft bed for the mercury bulbs to rest upon.

It is an excellent thing to learn to judge of the condition of a patient's temperature by the touch, training the fingers or hand to feel differences, and controlling the impressions thus received with the results obtained with the thermometer, since the attention of a nurse with a well-trained touch may sometimes be drawn to an unusual condition in a patient that otherwise might pass unnoticed. It should be remembered, however, that the surface temperature is not a reliable index to the general bodily heat: the skin may feel comparatively cool when the thermometer in the rectum shows an elevation of several degrees.

The thermometer is of great value in diagnosis, and in any doubtful case the temperature should be taken at short intervals until other symptoms manifest themselves. In hospitals one occasionally meets with a malingerer who, if not watched, will put the thermometer near a hot-water bag or in other ways produce an unaccountably high record. With children a high temperature is not necessarily so serious as the same would be in an adult. In hysteria the temperature

may reach 104° or 105° F., and then fall without a recurrence. This, however, is of very rare occurrence.

In recording a temperature or pulse, where any doubt exists as to the accuracy of the observation it is advisable to place a question-mark (?) after the record, in order that the attention of the physician may be called to the possibility of an inaccuracy. But extremely high temperatures are possible. These are instances of the so-called "paradoxical" temperature, and are more likely to occur just before death. Observers whose reliability cannot be called into question have reported temperatures (in the last stages of disease) as high as 112° F. In sunstroke 109° F. and even higher temperatures have been recorded. Hilton Fagge cites a case of a young woman (observed by Teale) in which on four different occasions the mercury was buried in the bulb at the top of the thermometer at a point above 122° F. Whenever, however, the thermometer registers an extraordinary temperature (whether above or below normal), the results should be controlled more than once, and several different instruments should be employed, before we are convinced that no error on our part has been made.

Fever is present in almost all acute infections; it is not a disease in itself, but a symptom. The progress of a disease may oftentimes be estimated and indications for treatment may often be obtained by watching the course of the fever.

Fever or pyrexia may be classed as continuous, remittent, or intermittent. A *continuous fever* is one in which the temperature is uniformly above the normal

line with but slight variations, such as is seen in pneumonia. In a *remittent fever* there is a rise and fall as in typhoid fever, although the temperature never reaches the normal line. In *intermittent fever* the temperature is high, but at some time during the twenty-four hours drops to the normal line or even below it, as in tertian malarial fever.

A febrile temperature may fall by crisis or by lysis. By *crisis* it drops suddenly to the normal, as is usual in pneumonia, while by *lysis* the fall is gradual, as in typhoid fever. A convalescent's temperature may be influenced by apparently trivial causes, such as slight over-exertion, a change in the diet from light to more solid food, or by excitement of any kind. A sudden and decided increase generally indicates some complication, and the doctor should be informed at once; in fact, any rise of temperature above 103° F. should be reported. More than this, a sudden drop from a high temperature to a subnormal point (unless in pneumonia) most probably indicates collapse, and the physician should be notified.

Before death the temperature in fevers may be very high, while in chronic malignant diseases and cachexias it may be subnormal.

Charting temperatures should be done with neatness and accuracy: one nurse at a time should be set apart to take temperatures and pulse-rates and record the same for the whole ward.

The lines should be lightly and evenly drawn, the point at which the temperature stands being indicated by a small (not too heavy) dot. The night and morning records are best done in black, while the tempera-

tures taken in the intervening hours may be marked in red ink.

The so-called temperature-curve formed on the chart by means of connecting lines instead of by a series of numbers is often so characteristic as to be of distinct assistance in diagnosis. It may be studied on the 24-hour chart in three sections, the onset, the height, and the decline.

The chart for a new patient should be headed with the patient's name, date and hour of admission. The diagnosis can be added later. The pulse, temperature and weight on admission should then be charted. Only temperature, pulse and respirations that have been carefully taken should be recorded. Any other observations are noted in the hourly record sheet.

A patient should not have access to his chart, nor is it right to keep him informed of the course of his temperature, since it may have a bad effect upon even the most sensible person to know that his fever still continues high.

The specimen charts of typhoid fever, pneumonia, and malarial fever given at the end of this chapter, and taken from actual cases, show the variations and different types of temperature in those diseases, and also the method of charting (Plates III, IV and V). Plate VI is an example of a bedside record.

The Pulse.—The examination of the pulse is an important guide to the patient's condition, since from it one may draw conclusions in regard to the strength and action of the heart. One of the most difficult things a nurse has to learn is to count the pulse accurately and to understand its variations and their significance. This requires much practice, and the

proper skill can only be acquired by much perseverance and close study. She should begin by counting the pulses in normal cases until she becomes thoroughly acquainted with the characteristics of the healthy pulse and whenever she has an unoccupied moment she should count the pulses in various patients and note their differences and peculiarities. When she has heard the pulse of a patient described, she should examine it repeatedly until she feels that she could recognize another like it. Frequently it is necessary to watch the pulse of a sleeping patient: this should be practised until it can be done without disturbing the sleeper.

The pulse is dependent upon the rhythmical contraction of the heart. With each heart-beat the blood is sent through the arteries with more or less force, distending the arterial walls, and it is the sudden expansion of the artery, felt under the fingers, that we call the pulse. This distension takes place only during the systole or contraction of the heart, and the diastole or period when the ventricle is filling with blood is represented approximately by the interval between two pulse-beats. An artery can be recognized by the intermittent pulsation in it and by the elasticity of its walls. The rise of the pulse-wave is clearly defined, but can be arrested in normal cases by firm pressure made with the fingers. The points to note in taking the pulse are—

1. Frequency;
2. Rhythm (of irregular force);
3. Whether or not it is intermittent;
4. Size of artery;

5. Degree of distension between the beats, if any exists;

6. The character of the pulsations—
   - *(a)* Whether the rise is sudden or gradual;
   - *(b)* Duration of impulse—long or short;
   - *(c)* Fall—abrupt or gradual;
   - *(d)* Dicrotism;

7. Compressibility—
   - *(a)* Low tension;
   - *(b)* High tension;

8. Thickening (atheroma) of the vessel-walls.

The character of the pulse depends upon the action of the heart, the condition of the arteries, and the amount of resistance in the capillaries.

The action of the heart determines—

(1) The frequency of the pulse;

(2) Its rhythm and regularity;

(3) Its force and strength.

By frequency is meant the number of beats in a given time. The normal number of beats in a minute varies in different people, and the pulse is slower and stronger in men than in women, and in women than in children. The blood-pressure is determined by the force of the heart and the resistance in the arterial and capillary circulation.

The average pulse in

Men	is from	60 to	70
Women	"	65 to	80
Children	"	90 to	100-120

The normal pulse is recognized by—

(1) Its perfect rhythm;

(2) The equal force of successive heart-beats;

(3) The medium size of the artery.

The pulse is usually taken at the wrist, where the radial artery is easily felt pulsating because it lies directly over a bone and is superficial. The index and middle fingers are placed over the artery, pressing firmly enough to feel the beat. One counts usually for half a minute. After long practice it is possible to count accurately a pulse as frequent as 160. It is sometimes more convenient to take the pulse in the temporal artery.

The normal pulse may be affected by the same causes which produce variations in the normal temperature. Its frequency is increased by—

(a) Food or exercise. The pulse will be fuller and more forcible, and the vessels of the surface are relaxed.

(b) Excitement. It is quickened, but the acceleration lasts only while the excitement continues. Stimulants accelerate the pulse slightly and relax the superficial vessels.

(c) Position. The rate is higher when the patient is standing than when sitting or lying down.

It should be noticed whether the pulse at both wrists is the same, as the volume or frequency of one is sometimes greater than that of the other: in aneurism there may be almost complete obliteration of the pulse in one wrist. One will be startled at times, on feeling for the pulse of a newly-admitted patient, to find absolutely no pulsation over the spot usually palpated. This is frequently due to an anomalous distribution of the vessels in one arm or to a previous injury which has severed the radial artery on that side.

In illness the pulse indicates the effects of the disease on the system and the existing amount of endur-

ing power. One of the most marked differences between the pulse in health and in disease is that in the latter there is an increased susceptibility to the same influences that cause variations in health. In most diseases the pulse is accelerated, and the more frequent the number of beats the weaker, as a rule, the heart's condition.

The terms used to express the quality of the pulse, "quick" and "slow," "strong" and "weak," are vague, inaccurate expressions, as *quick* or *slow* might refer to the length of each beat or to the rate at which the beats follow one another, and *strong* and *weak* are quite indefinite. We use the term *frequent* for a pulse up to 110 or 115; a pulse of from 115-140 we call *rapid;* a pulse of from 140 and upwards we call *running.*

We speak of a pulse being long or short when describing individual pulsations. The terms forcible, vehement, sluggish, or feeble, are also used to express various conditions. There are several different types of pulse; thus a pulse may be—

1. Irregular (either in force or in sequence);
2. Intermittent;
3. Dicrotic.

In an *irregular pulse* the beats differ in length, force and character: the term may apply to the strength or to the rhythm or to both. An intermittent or an irregular pulse may be induced by—

1. The condition of the heart or respiratory organs.
2. Acute disease, when it may be a grave symptom;
3. Certain conditions of the nervous system.

When the pulse is intermittent a beat is lost from time to time. Where this occurs, as it sometimes does,

in health the causes are not fully understood. The condition may be brought on by nervousness or exhaustion.

A *dicrotic pulse* indicates a relaxed condition of the arterial system, and consists of one beat followed by a second, which is in reality a wave in the blood-current produced not by another contraction of the heart, but by the closure of the aortic valves. This secondary pulse-wave is usually less forcible than the first, but sometimes resembles it so closely as to be counted as an individual beat. Medical students and young nurses, in counting a pulse of this kind, sometimes obtain a result exactly double the actual number of heart-beats. The error becomes at once apparent if one hand be held over the point of maximum impulse of the heart on the chest wall while the other is at the wrist. A dicrotic pulse is found frequently in the acute fevers, particularly in typhoid fever.

The tension of a pulse is determined by the degree of resistance which the artery offers to the pressure of the fingers, and the terms used in this connection are "high," and "low;" if the resistance is considerable, we say that the tension is increased or that it is plus (T+); in the opposite condition we have a decreased or minus tension (T—).

The remote causes of high tension are—

1. Excess of animal food or alcoholic drinks.

2. Sedentary habits with the resulting imperfect oxidation.

3. Constipation.

High tension may be present as a result of obstruction in the arteries or capillaries, caused by—

1. Changes in the vessel-walls or deposits of lime due to age;

2. Gouty conditions;

3. Organic disease of the heart or kidneys;

4. Chronic lead-poisoning.

Sometimes also there is a pulse of high tension in pregnancy.

In a low-tension pulse the arterial tension is diminished, owing to the weakened condition of the heart or to a relaxed state of the peripheral vessels, and the pulse becomes easily compressible: it may have the feeling of being large and full, but this does not always indicate an energetic and strongly-beating heart. In extreme cases, where the heart is very weak and the amount of blood sent out with each systole is small, the pulse becomes easily compressible, and we have what is known as the running pulse. Low tension may be produced by fever, prolonged exertion, mental or bodily fatigue, and certain conditions of the nervous system.

The special characteristic of a high arterial tension is the non-compressibility of the pulse-wave; the artery may remain full between beats, and may be rolled under the finger like a cord. The pulsation for this reason may not be very marked, and may convey the impression that the pulse is not strong, but on examination it will be found to resist more strongly the more it is compressed. The immediate causes of this condition are—

1. Increase in the force of the heart's beats;

2. Contraction of the smaller arteries (*e. g.* from the application of cold to the external surface of the body).

One should be very observant of the effects produced upon the pulse by therapeutic measures. In giving medicines which affect the heart any difference in the pulse before and after administration should be carefully noted. If a bath is ordered the pulse should be watched closely. Stimulants increase the frequency of the heart's action, while antipyretics have a depressing effect.

A persistently slow pulse is often observed in meningitis, cerebral tumors, in certain forms of drug poisoning, and sometimes in convalescence, especially after influenza.

The ratio borne by the pulse to the temperature and respiration is of much importance. If a pulse is more frequent than the temperature would lead us to expect, this is usually an indication of a weak heart, and the weakness is, as a rule, in proportion to the deviation from the normal ratio of pulse to temperature.

The Respiration.—External respiration is the act of taking in and giving out air by the lungs. This permits of the interchange of gases in the lungs, the blood in the small capillaries being separated from the air by an extremely thin membrane. The venous blood brought to the lungs by the pulmonary artery is oxygenized, and returns through the pulmonary veins to the left heart as bright arterial blood. The average number of respirations to the minute in an adult is eighteen, in a child from twenty to twenty-four. Any marked variation from this is abnormal. A single breath consists of two parts, characterized by the alternate expansion and contraction of the chest; with dilatation we have inspiration; with contraction, expiration. There are normally four heart-beats to one

respiration. In disease there are marked variations in the character of the respiration. The breathing is slower and shallow in narcotic poisoning, shock and collapse. On account of pain it is restrained in pleurisy and peritonitis; it is shallow in ascites, abdominal tumors and advanced pregnancy. In cerebral hæmorrhage the cheeks are puffed out with each breath. In some diseases such as peritonitis and pneumonia, the respirations may be very rapid; when they number over forty to the minute this symptom is considered grave. There are cases, however, in nervous and hysterical patients where the respirations may be exceedingly rapid, perhaps over sixty to the minute. In some pulmonary diseases the respiration may often be out of proportion to the pulse-rate. The same exciting causes which affect the normal pulse and temperature apply equally to the respiration. Not only are the rate and general character of the respiration to be noted but also the effect exerted upon it by position, and the way in which the two sides of the chest move. In making a record of the respirations one should note—

1. The frequency; 2. whether regular or irregular; 3. whether difficult or easy; 4. noisy or quiet; 5. deep or shallow; 6. the symmetry or asymmetry of the chest and its movements; 7. the type, abdominal or thoracic.

Stimulants accelerate the pulse slightly and relax the superficial vessels.

In some affections, such as asthma and heart disease, there is dyspnœa—that is, difficulty in breathing—and a sitting position is the most comfortable. In heart disease when the lungs become engorged with blood owing to defective circulation, the breath comes

in short gasps, and the condition is not only dangerous but very distressing to the on-lookers.

The most peculiar type of breathing is that found in the dyspnœa of certain diseases of the heart and kidneys, known as *Cheyne-Stokes* respiration. There is an increase in the frequency and intensity of the respirations up to a certain point, then a gradual decrease until they entirely cease for several moments, when the cycle is repeated. Sometimes in affections of the lungs the movements associated with the thoracic breathing are limited to the upper part of the chest. When the abdominal walls are sucked in with each inspiration the condition is grave.

Stertorous breathing is characterized by a loud snoring sound with each inspiration. The stertor is due to paralysis of the soft palate causing it to hang down and obstruct the free exit and entrance of air to the lungs. The symptom may often be relieved by propping the patient on his side.

In taking the respiration one must not allow the patient to be aware of the fact, for he will unconsciously control it. After taking the pulse the fingers may be left on the wrist, and while the counting is apparently continued the rise and fall of the chest may be noted. In some cases the exact rate can be determined correctly only during sleep.

At times the breathing is so bad that the patient cannot assume the recumbent posture at all—a condition known as *orthopnœa*. The ear should be trained to detect differences in breathing, so that even in the dark the slightest change may be at once noticed.

Record of treatment. In diseases where changes in treatment are few, as in typhoid fever, a brief note of

the various procedures can be made on the temperature chart (see specimen chart). After operations, however, particularly after abdominal sections, and in certain diseases where the treatment varies every few hours, a bedside or hourly record-sheet should be kept, each step of the treatment being neatly and accurately put down by the nurse. Such notes should contain a simple and concise statement of the treatment given and the developments throughout the course of the disease. Such a sheet should not be arranged for more than twenty-four hours, so that at the end of that time a summary of the whole condition can be given. The physician on his morning and evening visits will then be able to see at a glance just what has been done, without having to listen to a detailed report before the patient. The temperature should never be reported to the physician nor the symptoms discussed in the presence of a patient: if it is necessary to see the physician alone for a moment, the nurse should try to do so outside the room either before or after the visit, though, as a rule, the record should be clear enough on all points to fully explain the case.

DATE, May 20, 1892. PLATE VI.

Hour.	Temp	Pulse.	Sleep.	Urine	Stool.	Medicine.	Stimulant.	Nourishment.	REMARKS.
A. M.									
1				Per cath 200 c. c,				Enema {Pep. milk, ℥iij Brandy, ℥j.	Retained enema. Has had much pain.
2						Tr. capsici, gtt. iij			
3			1 hour.						
4	98.6	72							Vomited greenish clear fluid, ℥ijss
5								Enema {Pep. milk, ℥iij Brandy, ℥j.	Retained enema. [night.
6									Has been noisy the latter part of
7									
8	99.6	80		Per cath 170 c. c					
9			½ hour.					By mouth: Milk and lime-water, ℥j.	
10			½ hour.				Brandy, ♏xxx		
11								Milk and lime-water, ℥ij.	
12	99.8	76							Headache. No other pain.
P. M.									
1			¾ hour.					Milk and lime-water, ℥iij.	
2				Voided 100 c. c.			Brandy, ♏xxx		
3								Milk and lime-water, ℥iij.	
4	100	78							Enema, {Oil, ℥iij; Turpentine, ℥ss.
5								Milk and lime-water, ℥iij.	Enema, {Soapsuds, Oj; Rochelle salts, ℥ss.
6			½ hour.				Brandy, ♏xxx		Enema expelled; partially-formed stool, moderate amount.
7					1			Milk and lime-water, ℥iv.	
8	99.6	82				Tr. capsici, gtt. iij			
9			1 hour.					Milk and lime-water, ℥iv.	Rectal tube inserted. Flatus expelled.
10							Brandy, ♏xxx		
11			45 min.	Voided 300 c. c.				Milk and lime-water, ℥iv.	Comfortable. No pain.
12	99.8	72							

SUMMARY: Sleep, 5 hrs. Urine, 770 c. c. Tr. capsici, gtt. vj. Stimulant, brandy, ℥ ij. Nourishment, milk and lime-water, ℥ iij. by mouth; milk by enema, ℥ vj; brandy by enema, ℥ ij. Purgative enemata, ij. Stool, 1.

CHAPTER X.

External Applications (general and local)—Dry Heat.—Hot-water Bags and Cans.—Hot Bottles, Flannels, Salt-bags.—Moist Heat.—Fomentations.—Poultices.—Moist-air Tent.—Cold Applications.—Ice.—Cold Water.—Lotions.

External heat, whether applied generally or locally, is intended to give additional warmth to the body, to allay inflammation and relieve pain, to promote suppuration, or to act as a diaphoretic. Cold applications are used chiefly to reduce temperature and inflammation, but sometimes also for their stimulating effect.

It is a matter of every-day experience that warm weather makes itself felt much sooner and more severely when the atmosphere is saturated with moisture than when it is dry. Just in the same way hot moist applications have a much more marked effect and are more depressing than dry heat at the same temperature.

Dry heat when required for its general effect is obtained by means of the hot-air bath, which is often ordered when the kidneys are failing to do their work well: the waste products, not being excreted in the normal amount, are accumulated in the system, and the hot air, acting upon the body by dilating the superficial blood-vessels, produces copious perspiration and brings about in this way the elimination of much of the poisonous material. The method is described in the chapter on Baths.

When dry heat is applied for the sake of warmth alone, it is best to use hot bags, bottles, or cans. Such bags are made of india-rubber and are of different shapes and sizes. They should be filled not more than about half full of hot water, for when quite full they would be heavy and difficult to adjust: before the top is screwed on the air must, as far as possible, be expelled. Hot-water bags must be watched, as they are liable to leak and make the bed wet, if the top be not tightly fastened.

Except for applying heat to flat surfaces, such as the side of the face or abdomen, hot-water bags are not so serviceable for hospital use as the hot-water tins, bottles or bricks. In using tin cans particular care must be taken lest the patient be burned: they are especially valuable in warming the bed for an operation patient, but on no account should they be left beside an unconscious patient unless they can be constantly watched. In invalids the vitality of the tissues is lowered, and it is an easy matter for them to sustain a burn which in their case may prove very troublesome, though in a healthy person it might heal at once. This is especially true of paralytics. Hot bottles are not very safe, as they are apt to crack or burst. If they must be used, they should be placed with the corked end away from the patient, and should not be filled more than two-thirds full. The chief recommendation of bricks is that they retain the heat a long time; on the other hand, it may be objected that they are uncleanly and clumsy. As in the case of the hot-water bags, these cans or bricks should be protected with cases made of ordinary flannel or of canton flannel, and placed in the bed with a blanket between

them and the patient. These appliances are used in the warming of beds for operation patients, for cold extremities, for pain, during a chill, in cases of collapse or shock, or for very ill patients in the early morning hours.

Hot flannels are sometimes ordered for inflamed joints and abdominal pains. The flannel should be made very hot, wrapped in a heated paper or cloth, and applied quickly, the whole being covered with a layer of cotton-wool and oiled muslin. Salt-bags are used for the same purpose, for neuralgias, and more especially for earache. They are simply flannel bags filled with sea-salt, heated just as hot as can be borne, and covered with cotton-wool and oiled muslin. They retain the heat a long time, and are very soothing. In earache competent authorities recommend the use of the so-called "Japanese hot box."

Dry heat at high temperatures is employed as a therapeutic agent in chronic gouty or rheumatic affections, arthritis deformans, gout, sciatica, lumbago and other conditions. For this form of treatment special kinds of apparatus are found in many hospitals; but owing to the cost and bulk and because the treatment when properly given consumes a good deal of time their use is largely confined to institutions. The usual temperature at which the hot air is applied to the whole of the body, exclusive of the head, ranges between 220° and 280° F., but for the limbs it may be as high as 300° or even 380° F.

Moist heat is more penetrating and has a more pronounced effect than dry heat. It is applied in cases of muscular spasm, since by dilating the superficial blood-vessels it relaxes the tissues, quickens the circu-

lation in the affected part, and by drawing the blood to the superficial vessels relieves the tension of those more deeply seated, and thus eases the pain. Moist heat is better in acute inflammations that can not be prevented from going on to suppuration. The applications should be as hot as can be borne. They hasten suppuration by increasing and promoting the activity of the leucocytes or white blood-corpuscles, the relaxed condition of the blood-vessels, caused by the heat and moisture, perhaps facilitating their escape through the walls of the vessels.

For a general systemic effect warm tub-baths are ordered: they relax the muscles, relieve nerve-tension, equalize the circulation of the blood, and induce sleep. For sleeplessness they should be given in the evening after all arrangements for the night have been made, so that the patient will not again be disturbed. The vapor bath is another method of applying heat generally, and is used for the same purpose as the hot-air bath. For localized pain, fomentations, stupes, and poultices of various kinds are prescribed, their action being precisely the same, since they relieve pain and inflammation by dilating the blood-vessels in the neighborhood of the painful part. Poultices or cataplasms are best used in cases of deep-seated pain or continuous inflammation. They may be made of any non-irritating substance which will hold and convey moist heat, both of which conditions are fulfilled by linseed, which is perhaps most commonly used. To make a *linseed poultice* the meal is stirred slowly and evenly into water which is already boiling: the mixture is then boiled for several minutes, being stirred briskly all the time; when thick enough it is beaten well with

a spoon in order to remove the lumps and to incorporate into it a certain amount of air, which will make it light. If well beaten and boiled, it will make a light smooth paste, just stiff enough to drop away from the spoon. A layer half an inch thick is spread on a piece of muslin or coarse cloth of the required size, a margin of an inch being left to be turned in; the surface is vaselined and covered with a layer of thin gauze; the edges are turned over and the whole is covered with a rubber cloth or rolled in a towel to keep it warm, and carried to the patient. The spreading of the poultice is facilitated by the use of a thin piece of board—a "poultice board"—upon which the cloth is laid. One poultice should never be removed until another is ready to be put on. Before it is applied the skin is to be wiped dry. Oiling the poultice with vaseline prevents irritation of the skin and the formation of papules. The poultice when in place should be covered closely with a layer of cotton-wool and oiled muslin to prevent the escape of the heat and moisture. It must be changed at least every three hours, and where it is desired that a uniform temperature be maintained it should be changed oftener—every hour or so. A poultice should be applied as hot as the patient can bear it: it should never be left on until it becomes cold, and should never be reheated and used again. Bread poultices are seldom used, as they retain the heat and moisture only a very short time. They are made by pouring boiling water over the soft part of the loaf. The vessel is put over the fire until the bread is thoroughly soaked. The water is then poured off and the mass is beaten quickly with a fork, after which it is ready for use.

Linseed poultices are sometimes ordered to remove sloughs from a wound, and then are best made with 1:40 carbolic-acid solution, which is also slightly stimulating and destroys odor. They are not so useful for this purpose, however, as gauze wrung out of a 1 per cent solution of carbolic acid or a saturated solution of boric acid, laid in light fluffs against the parts and changed frequently. If poultices are ordered for such a purpose, they should not be left on after the slough has come away. One sometimes sees them used until the granulations and surrounding tissues look pale and flabby, a condition which indicates a lack of vitality due to too much moisture, the tissues having become water-soaked. Charcoal as a deodorizer is occasionally ordered where there are sloughs which give off an offensive odor. One part of powdered charcoal is mixed with two parts of linseed, and the poultice made in the usual way: before applying, it is well to sprinkle a little charcoal over the surface. The application, however, is a very untidy one, and for this reason is seldom ordered. On the other hand, gauze dipped in a saturated solution of permanganate of potassium makes an excellent deodorizer.

A *starch poultice* on account of its soothing properties is used in skin diseases where there is much irritation. The starch is mixed first with a little cold water, and then enough boiling water is added to make a thick paste, which is then spread on muslin covered with a layer of gauze. If there be a great deal of pain, a few drops of laudanum may be sprinkled over the surface just before the poultice is applied.

The *jacket poultice*—sometimes ordered in lung affections—is made as follows: Two layers of thin

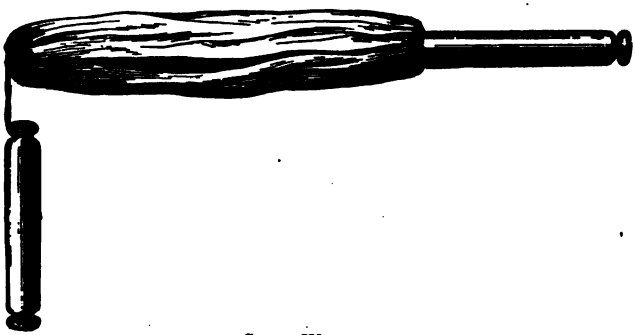
muslin are shaped so as to fit closely around the neck and under the arms, and come over the chest and back low enough to cover the lungs. Three sides are now closed and the prepared linseed is poured into the bag and properly distributed. The open end is then closed and the jacket is applied; over it comes a covering of wool and oiled silk, and the whole is kept in place by means of safety pins or tapes which are tied under the arms and over the shoulders. In changing such a poultice care must be taken not to expose the patient. For a few days after it is discontinued a cotton-wool jacket must be worn.

To make a *mustard poultice,* take of ground mustard from one-eighth to one-fourth of the amount of meal used. Make into a paste and stir this into the linseed after it has been prepared for the poultice. *Yeast poultices* are often ordered for their stimulating effect for ulcers, gangrene and sloughing conditions. They are prepared as follows: Mix eight ounces of soft yeast with a similar quantity of water. Add enough flour to make a sponge, but not too stiff. Keep in a warm place until fermentation has begun; then apply daily. Charcoal is sometimes added to these applications. For the soothing effect, *hop-bags* or *bran-bags* dipped in hot water may be applied, protected and kept in place with a firm bandage.

The most pleasant way of applying moist heat is by means of *fomentations,* but they are somewhat troublesome, as they require to be changed very frequently. Where heat is the first requirement, a change is necessary every ten or fifteen minutes, but if they are used principally for their moisture, about every twenty minutes. In no case should they be left on until they

are cold and clammy, and in fact, unless very thoroughly applied, fomentations do little or no good. The most suitable materials are sheets of lamb's wool. The layers of wool are cut into the size required and encased in a gauze cover over which is put a layer of oiled silk. The wool makes a very light and durable *stupe* and one that holds the heat a long time. If the wool is not obtainable, coarse old flannel or an old blanket will answer excellently, as the fibres are thick enough to retain the heat for some time, while

Fig. 5.



Stupe-Wringer.

the meshes are coarse enough to allow the circulation of warm air through it. Two layers of flannel are taken, dipped in boiling water, and lifted into the wringer. The latter is made of a stout piece of ticking 18 inches long and 15 inches wide, with a hem at each end through which runs a stick. Another form of "stupe-wringer" may be made according to the figure here presented (Fig. 5). By twisting the sticks in opposite directions the flannel is wrung out so tightly that it will not drip, and then carried in the wringer

to the bed. By keeping two stupes in use, the one need not be removed until the other is ready. The skin having been first dried, the folds of the flannel are shaken out: the stupe is then put on and covered with a thick layer of wool and one of oiled muslin, such a covering being always allowed to overlap the poultice or fomentation by at least two or three inches. A fomentation or stupe over the abdomen can be kept in place by means of a many-tailed bandage which should be slipped under the back before the stupe is prepared. After stopping the use of stupes a layer of cotton-wool or flannel over the part for a day or two is advisable. Small hot compresses for the eye, breast or neck can be wrung out tightly, and perhaps best, in a lemon-squeezer or potato-ricer. Hot compresses are applied to the throat for spasmodic closure of the glottis as in spasmodic croup. Either hot sea sponges or layers of lamb's wool or flannel may be used instead. Since it is the combined effect of heat and moisture that is desired, they should be changed every ten or fifteen minutes.

The material used for hot fomentations for the breast should be cut in circular pieces large enough to cover the breast, and should have a small round hole in the middle for the nipple; the latter should never be covered.

In cases of bronchitis, especially in children and after a tracheotomy, warm moist air often helps in allaying the inflammation, relaxing the muscular tension and rendering the breathing easier. For such cases a moist air tent can readily be improvised by connecting by means of cords four sticks and stretching over the top a sheet, while another sheet is stretched

around the sides and reaches to the floor. In this way the bed is covered in entirely except for a small space which is left on the right side, sufficiently large to admit enough fresh air and to allow of the necessary care of the patient. Into this canopy the spout of the steam kettle is introduced. A certain amount of fresh air is, however, always necessary; otherwise the procedure may be too exhausting and productive of harm rather than of good.

The action of heat differs from that of cold, in that heat causes expansion and dilatation, while cold contracts. Heat increases the bodily warmth, cold decreases it. Cold may prevent suppurative processes, while heat tends to promote them. Both act as sedatives to painful nerves.

In inflammation a portion of the tissues is injured and certain changes occur, which are evidences that Nature is endeavoring to repair the injury done. These changes are associated with redness, heat, swelling, and pain, which in their combination are largely the expression of an increased supply of blood to the part. Unfortunately, Nature in her efforts too often goes beyond what is useful to the organism, and when the inflammation threatens to become too acute, it may be desirable to check it in its progress. It is just here that the value of cold applications is most marked. Acting as they do by contracting the small blood-vessels of the part they lessen the amount of blood directed thither, and so are often successful in preventing the formation of pus.

Cold is applied either by means of the cold bath or by compresses, packs, sponging, coils, or ice. The cold bath best allows of the general application of

cold. When this is used for its stimulating effect, it should not as a rule be continued longer than from three to five minutes, and a vigorous rubbing should follow, in order to secure reaction. The cold pack and ice-water sponging are used, as well as the cold tub, to reduce fever in the manner described in the chapter on Baths. *Cold compresses* are made of two or three thicknesses of lint or linen wrung out of cold water and applied over the inflamed surface, being changed frequently. If iced compresses are ordered, a small block of ice partially wrapped in flannel is placed in a basin: there should be two compresses, one of which is kept on the ice, while the other is on the patient. They are thus kept constantly cold by frequent changing. A little vaseline should be rubbed on in order to prevent irritation of the skin. Compresses are particularly useful where little weight can be borne. In swelling and pain in the knee-joint the joint is sometimes swathed in thick flannel compresses which are kept saturated with ice-water.

The most effectual way of applying cold continuously is by means of the india-rubber *ice-bags*. These can be made in different shapes; for instance, helmet-shaped for the head, but long and narrow for the neck and spine. Perhaps the most useful of all is the simple ice cap. The ice should be crushed into small pieces and mixed with a little common salt to intensify the cold. The bag should never be more than half filled, and one must be particular to expel the air, as far as possible, before screwing on the top. A layer of moist lint or cotton is always placed between the skin and the bag; otherwise the extreme cold is not only painful, but is apt to irritate the skin, even produc-

ing "frost-bites." The effect should always be carefully watched. If possible, it is better to suspend the bag, as the weight is sometimes a source of discomfort to the patient. A bandage can be fastened to the neck of the bag, and the two ends pinned to the pillow just high enough to allow the cap to barely touch the head. At times a piece of ice is wrapped in moist lint or old linen and passed gently over the head in order to cool it. Care must always be taken to refill ice-bags before the ice has melted; nurses are not always thoughtful enough about this, and a doctor's confidence in a nurse is justly shaken when he sees such neglect.

For certain cases *ice poultices* are sometimes better adapted than bags for the reason that they fit any part of the body and a greater degree of cold can be obtained. They are usually made of two parts of crushed ice to one part of linseed or bran together with a small amount of salt. Two bags of oiled silk are made of the required shape and size, one being smaller than the other; all but one of the sides are closed by means of adhesive plaster. The smaller bag is then filled about two-thirds full with ice, closed and slipped into the larger bag.

Ice-water coils are sold by the manufacturers but may be improvised from rubber tubing, which may be sewed upon a piece of rubber cloth in circles about an inch apart for five or six rounds; a yard or two of tubing is left at each end to be used as a siphon. A large pan of ice-water is raised above the patient, into which one weighted end of the tubing is placed, with a funnel inserted into it covered with gauze to prevent clogging, while the other end is

laid in a second basin on the floor which receives the water. The method is very cumbersome, and attention is needed to see that the upper pan is kept full. Coils are sometimes ordered for the head in delirium and for the abdomen in tympanites. The stream of water may be regulated by a stopcock, thus making the same amount of water last longer.

The process of crushing ice necessarily takes place in a hospital every day, and for this purpose a stout canvas bag should be kept on hand, in which the ice may be placed and beaten with a mallet when a large quantity is needed. For breaking up small pieces, an icepick is best, but in doing this at night the nurse must take care not to disturb her patients. Ice may be easily and noiselessly cracked with a stout hat-pin. In private nursing, where only a small quantity is needed, it should be preserved from melting by being wrapped in flannel.

By *lotions* are meant medicated moist applications; these may be either hot or cold. In using an evaporating lotion one thickness of lint or muslin is saturated and left exposed to the air to promote evaporation. The applications are changed often enough to keep the lint moist.

When non-evaporating lotions are ordered, lint or muslin, folded as for an ordinary cold compress, and wrung out of the required solution, is applied and covered with oiled muslin.

CHAPTER XI.

COUNTER-IRRITANTS.—MUSTARD POULTICES AND PLASTERS.—TURPENTINE.—IODINE.—CUPPING.—CANTHARIDES.—THE CAUTERY.

Counter-irritants are therapeutic agents applied externally to produce a condition of irritation or inflammation, in order to relieve a diseased condition in some adjacent or deep-seated part of the body. By the application to the skin of a substance which will irritate the ends of the sensory nerves and dilate the blood-vessels of the part, the flow of blood through these vessels is increased, and the tension in those more deeply seated is lowered as a result of reflex nervous influences which are as yet imperfectly understood. If an irritant be placed directly over an affected part, relief is often quickly obtained, and irritation set up purposely at some distance from the seat of the disease is also frequently beneficial. Thus, pain in the head or abdomen may be relieved by a mustard foot-bath, since the vessels of the lower extremities, dilating, attract large quantities of blood to them and relieve congestion in those of the head and abdomen.

By the use of counter-irritants we may produce at will:

(1) Mild irritation;
(2) Irritation producing inflammation;
(3) Vesication or blistering.

Mild irritants are called rubefacients, since they

cause redness of the skin by distending its capillaries. All classes of irritants act as rubefacients when applied only long enough to produce such an effect, but those commonly employed are mustard, turpentine, iodine, and aqua ammonia. Dry cups may also be used for the same purpose.

The mildest mustard application is the *mustard poultice:* it is made with linseed meal in the same way as an ordinary linseed poultice, except that 1 part of mustard is well mixed with 6 parts of the meal. This may be left on as long as it retains its warmth. Its action is more gradual and less irritating than that of the *mustard plaster,* which is made of mustard mixed with flour in different portions according to the effect desired. The usual formulæ call for from 1 to 6 parts of flour or meal to 1 of mustard, and the nurse should be able to state the exact amount of mustard used. These ingredients are rubbed thoroughly with cold or tepid water into a paste, which is spread between two layers of muslin or linen of the size required: the plaster is applied for from ten to twenty minutes, the outside being covered with folds of linen or cotton to absorb any superfluous moisture. The skin of one patient may be much more sensitive and respond more quickly than that of another, and when the stinging sensation is acute and the skin well reddened the plaster may be removed. Care should be taken not to leave it on long enough to blister the skin, as may happen with delirious or unconscious patients if the effect is not closely watched. Where the skin is very tender, as with children, the proportion of mustard should be diminished by one-half and the plaster left on only a few minutes, just

long enough to produce redness, after which a warm linseed poultice should be substituted for it. After a mustard plaster has been removed, the skin is dusted with rice powder, anointed with cold cream or vaseline, and covered with a soft piece of muslin. If the irritation produced is very great a layer of cotton may be added in order to exclude the air.

Mustard leaves, or *sinapisms,* are frequently ordered, but, though far more convenient, they do not take the place of the old-fashioned mustard plaster. The effect is very rapid and they cause so much discomfort from the time that they are applied that they frequently have to be removed before the desired effect is produced. Their chief recommendation is that they are ready at a moment's notice, as they need only to be dipped in tepid water and put on. A thin piece of muslin or gauze placed between the mustard leaf and the skin renders its effects more gradual. When the skin is thick and its action sluggish, the surface should be first scrubbed with hot water and soap to remove fatty substances, and then rubbed briskly before applying the mustard, otherwise the result obtained will be very slight and the process will take a long time. Mustard should not be mixed with hot water, as this destroys or lessens the strength of the volatile substance which gives the drug its irritating properties. As soon as the necessary reaction has been produced the plaster should be at once removed. The effect should be watched carefully, lest the action be more extensive than was intended and a serious blister result. Where the skin has been over-irritated the white of an egg will be found very soothing.

This may also be incorporated with the plaster before the latter is applied.

Capsicum and belladonna plasters, as is the case with mustard leaves, come ready prepared. In applying them the back of the plaster is heated slightly, the face gauze is pulled off and the plaster is then fixed firmly and smoothly to the skin. To facilitate removal it should first be soaked with alcohol.

A *spice plaster* is made by mixing ginger and cloves (two teaspoonfuls of each) with a teaspoonful of cayenne pepper, and a tablespoonful of flour, enough brandy or water being used to make a paste. This is spread between two thin layers of muslin.

Turpentine is also in common use as a counter-irritant, but is chiefly applied in the form of stupes for abdominal pain or tympanites. These are prepared and applied much as hot-water stupes. Half an ounce of turpentine is mixed with about a pint of boiling water; the flannel is dipped in it and wrung out very tightly. The mixing with the water tends to emulsify the turpentine (of course the oil will not dissolve in the water), and renders its application to the skin more uniform than it would be if it were sprinkled over the flannel; it also lessens the danger of causing blisters. The stupe should be applied as hot as the patient can bear it, and should be covered snugly with cotton wool, oiled muslin and a bandage. It may be repeated in fifteen or twenty minutes if the pain or distension is not relieved, provided that the skin is not over-sensitive.

Another excellent method of applying a turpentine stupe is as follows: Take of olive oil seven parts, turpentine one part; mix well; pour on a layer of absorb-

ent cotton or thin pad of gauze and apply to the surface of the abdomen once in six or eight hours; over this apply the usual hot fomentations every hour. This method obviates any blistering and can therefore be used much longer.

Tincture of iodine is applied both to the skin and mucous membranes, a camel's-hair brush or a swab being used to paint the fluid lightly over the seat of the pain. This first coating is allowed to dry, and a second then applied. More than two coatings are apt to blister, and on sensitive skins one will be found sufficient. To prevent blistering the application should not be repeated before the fifth day. As a rule it is best to use it early in the day after the bath as its effects need to be watched, and less disturbance of the patient will be necessary. If the smarting is intense, sponging with alcohol will relieve the pain. Iodine stains may be removed by soaking in a 2 per cent solution of carbolic acid.

Aqua ammonia may be ordered, as its irritating qualities serve as a stimulant where immediate reaction is required, as in conditions of shock or unconsciousness. A piece of lint saturated in the solution is applied usually between the shoulders, being closely covered with oiled silk, and left on for not over five minutes, otherwise it may burn deeply. Ammonia is also used as an application after bites or stings from insects or poisonous reptiles.

Chloroform is used alone as a rubefacient. It causes redness and smarting of the skin, and will blister if left on too long. It is also employed in liniments, both for its irritating and sedative qualities.

Liniments are of various kinds. They may be divid-

ed into two main classes—stimulating and soothing liniments. They are frequently used to allay muscular pain, and can be applied with friction and well rubbed in: a piece of lint soaked in the solution and bound on over the aching part for a short time often answers the same purpose.

Croton oil is a powerful irritant, producing an eruption in the form of little vesicles that may become pustules. From two to four drops rubbed on with a piece of flannel, are enough to apply to a surface of from 1½ to 3 inches square. The effects should be carefully watched and as soon as the skin is well reddened the part is rubbed with sweet oil to remove the irritant and a poultice applied. Its action is so powerful that physicians frequently dilute it with an equal amount of olive oil or oil of sweet almonds.

Cupping is of two kinds, wet and dry, and is sometimes ordered to relieve inflammations of the eye, lung, or kidney, or even muscular pains. Small glasses are made especially for the purpose, and come in sets of five; but if these are not obtainable, wine-glasses or medicine-glasses will answer. To prepare for dry cupping a spirit-lamp, matches, and cups are necessary. The usual method is to take a stiff metal probe or piece of wire, wrap about the end a small piece of cotton, dip this in alcohol, ignite it, swab the inside of the glass, remove, and apply the glass. The heat causes the warm air to expand, so that some is driven off, and the partial vacuum formed is filled by the skin and tissues over which the glass is placed. The main thing to remember is that the edges of the cup must never be allowed to become warm enough to burn the patient. Five to seven cups are applied at one time

and allowed to remain on five minutes, after which they are removed by making pressure about the glass and inserting the tip of the finger under the edge, so as to let in the air. Linseed poultices are sometimes used after the removal of the cups: in this way the dilatation of the blood-vessels may be kept up for some time. The process of wet cupping is carried out in much the same manner: one needs in addition a scarificator or small scalpel, a few sponges, and a dressing of lint for the wound. After the skin has been scrubbed with hot water and soap and washed off with a 1:20 carbolic acid solution, the surgeon makes a few small superficial cuts, over which the cup is applied. After a sufficient quantity of blood has been withdrawn, the bleeding may be checked by sponging, a pad of lint is placed on the surface, and held in position by a covering of gauze dipped in celloidin or by rubber strapping.

Cantharides is used for blistering. It is employed either as a plaster or in the liquid form; for the latter the powdered cantharides is dissolved in collodion (vesicating collodion). The plaster is the preparation most often used. The physician usually orders a plaster of a definite size and designates the part to which it is to be applied, but if no definite directions have been given the nurse must not use one larger than three inches square. The object of scrubbing the skin first with hot water and soap is to remove the oily substances or anything else that might interfere with the action of the plaster. The plaster is prevented from becoming displaced by passing a bandage around it loosely: there must be no pressure, as plenty of room must be left for the formation of the blister; and

for this reason the plaster should not be held in place by adhesive strapping, for if it cannot yield pain will result from this tension. The plaster is left on for from four to eight hours; in children from two to four hours will be long enough, according to the effect desired. When the skin is well reddened the blister is removed and a poultice applied. If it is necessary to blister, and vesication has not appeared at the end of eight hours, a linseed poultice may be put on over the plaster to supplement its action. Great care should be exercised when blistering applications are used over the region of the kidneys, or anywhere, in fact, in the case of patients suffering from kidney affections; cantharides is a most violent irritant, and not infrequently causes strangury, or may even set up an acute nephritis: In applying the cantharidal collodion, the space to be covered is first outlined with oil to prevent the spreading of the vesicant; the collodion is painted over the surface by means of a camel's-hair brush, and afterward covered with a layer of soft lint and oiled silk.

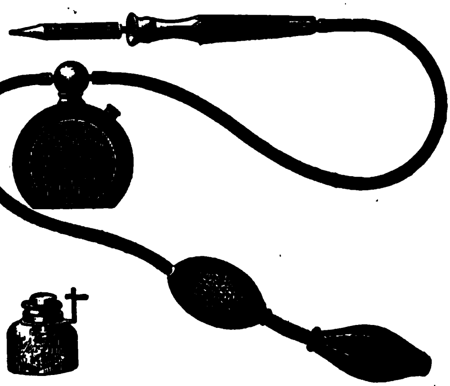
To dress a blister, the lower part of the bleb is punctured with a scalpel or the scissors, and the fluid which comes from it is caught on absorbent cotton; when it is empty a simple dressing of oxide-of-zinc ointment or vaseline on lint is applied and held in place with collodion or strapping. One must never remove the skin from a blister at the first dressing. Sometimes it is desirable to have the fluid reabsorbed, in which case precautions are taken to prevent rupture of the vesicle.

Leeches are seldom ordered now-a-days, except for mastoid inflammations, as wet cupping is more cleanly

and usually answers the same purpose. A leech is capable of removing from a drachm to half an ounce of blood. The skin, after being scrubbed briskly with soap and water, is dried and rubbed, and the leech applied. This is done by placing the animal in a glass tube or medicine-glass with its pointed extremity (the head) toward the orifice of the glass, which is inverted and applied to the spot where we wish the leech to fasten itself. If it is slow about biting, a little cream rubbed over the spot or a drop of blood from a needle-prick will cause it to take hold. It may be left on for from half and hour to an hour, according to its activity: if very sluggish, it should be gently stroked with a bit of linen. When full it generally lets go of its own accord; if not, a little salt sprinkled on its head will cause it to drop off. An attempt to pull it away may result in the breaking off of its teeth, which when left in the flesh may set up inflammation. To increase the bleeding after the removal of the leech hot poultices or stupes are useful; where it is too free, a compress snugly applied or ice wrapped in lint, and held in place by a bandage over the wound, will usually be sufficient. The patient must be watched until the bleeding has ceased. Leeches should not be applied over large blood vessels—bony surfaces, over which pressure can be applied, should be chosen. The same leech should never be used twice. Leeches are best kept in a jar of water covered with a perforated top and having a little mud at the bottom: it is not necessary to change the water often. Those of the American species are the best to use for children, since they abstract less blood and are less vicious than foreign leeches.

The Actual cautery.—By the application of the actual cautery, as opposed to other methods of cauterization, is meant the use of the heated iron. The most valuable form of cautery and the one most often employed in hospital practice is that known as the thermo-cautery. The instrument invented by Paquelin of Paris is perhaps the most suitable (Fig. 6). The principle of the apparatus is based on the property possessed by platinum of remaining incandescent,

Fig. 6.



PAQUELIN CAUTERY.

when heated red-hot, as long as the vapor of some highly combustible carbon compound is thrown upon it. Platinum points, of shapes varying according to the purposes for which they are to be used, are attached to a tube connected with a bottle of benzine, the vapor of which is pumped slowly by means of a rubber hand-bulb into the hollow platinum point.

When not in use the different parts are kept in a

box in special compartments which allow the instrument to be safely carried about.

About the employment and care of the Paquelin cautery we shall now say a few words:

1. The preparation of the instrument for use: (*a*) A small quantity of benzine is poured upon a piece of absorbent cotton which is placed in the bottom of the bottle, only as much as is sufficient to saturate the cotton being used. This precaution prevents the escape of any excess of benzine when the cautery is in use, for if a bottle containing benzine as an ordinary fluid be used, the liquid occasionally gets into the rubber tubing and an explosion may occur. (*b*) The rubber tubing with the bulb is connected by means of the stopper to the bottle containing the benzine, and the platinum tip is screwed to the handle, the other end of which is attached to another piece of tubing. (*c*) After firmly adjusting the handle to the platinum point selected for use, the tip should be held in the flame of a Bunsen burner or of an alcohol lamp: then the nurse should attach the benzine bottle by the flange on its side to her waistband, and be ready to force air through the bulb by squeezing it with the right hand. As soon as the platinum point becomes red hot, she should squeeze the bulb gently, thereby forcing the air charged with benzine vapor through the tubing to the point where it ignites and maintains the heat. The nurse is frequently called upon by the surgeon during an operation to prepare and to take charge of the cautery and keep it ready for use: to accomplish this she must squeeze the bulb gently and at regular intervals. If the pressure is too forcibly or too quickly made, more benzine than is necessary is

burned and the platinum point becomes red hot. The tips are not often used in this condition, being generally employed at black heat.

2. The therapeutic application of the cautery: As a counter-irritant it sometimes serves to dissipate effusions around or in joints, and is of great value in relieving the pain attending stiff neck and the various forms of so-called muscular rheumatism.

To produce counter-irritation with the cautery, the parts to be treated should not be actually touched, but the heated tip is passed quickly to and fro close to the surface, without, however, ever coming in contact with the skin. Such an application of the cautery is at times followed by the most gratifying results, as it will relieve pain almost anywhere, and at the same time is not accompanied by any blistering or marking of the surface of the skin.

Very frequently the actual cautery is used for controlling hemorrhage in abdominal surgery, where surfaces from which adhesions have been separated persistently bleed; thus, for instance, where there is a broad area of oozing, the cautery lightly applied will often control the hemorrhage.

3. In some instances the surgeon uses the cautery in the place of a knife to divide tissues.

4. *The Care of the Apparatus.*—Since the cautery is an expensive instrument, great care must be taken in returning it to its case after use. The points are very delicate, so that the apparatus can be ruined much more easily than one would imagine. The following rules should be observed.

First: If there should be burnt particles of tissue clinging to the platinum tip, it is held in the alcohol

flame until the metal is brought to a white heat so as to consume whatever is adherent to it. While the tip is still hot the handle which is attached to the rubber tubing is to be removed, so as to prevent any benzine from being carried into the tip while it is cooling.

Second: After the handle with the attached tip has been removed from the tubing, it should be so placed that the tip does not come in contact with any surface which might indent it and thus occlude the canal. When the metal has sufficiently cooled off, the handle is unscrewed, and each part immediately placed in its proper compartment in the case.

Third: Under no circumstances is the platinum tip to be placed in water for the purpose of cooling it.

Fourth: Finally, the instrument should be carefully arranged in the several compartments in the box and the latter kept in a safe place. If the cautery is to be packed in an instrument-case, the nurse must be careful to place it securely in a position where it will not be jolted or in any way come in contact with hard surfaces, so that any chance of injury to it may be avoided.

CHAPTER XII.

MEDICINES.—METHOD OF ADMINISTRATION.—DOSAGE.—WEIGHTS AND MEASURES.—MEDICINE-CLOSETS.—MEDICINE LISTS.

The administration of medicines is a duty that begins early in the first year of a nurse's instruction, and is associated with more or less fear on her part lest some error be committed. To be quick and accurate at the same time is an impossibility, when attempting to give medicines at first, and there is no cause for discouragement because it takes so long to make quite sure that the quantities are correct. A beginner should first act as an assistant, being allowed to measure out any harmless doses ordered, until she has overcome her early awkwardness and is familiar with the different measures. It is necessary that a woman, who is a nurse or who wishes to become one, should know more or less arithmetic, at least enough to comprehend clearly the different standards of weight and measure, and their relations to one another. Thus it is often necessary to deal with fractions of doses and to know what is meant when the strength of a solution is stated in percentages; frequently a nurse will be required to dilute a solution of a certain percentage to another of quite different proportions. If the principles on which these processes are based be not understood, the reckoning must be done mechanically, with

but little knowledge as to whether it is correct or not, and consequently will always be attended by a certain amount of danger. If there be any one thing that must be guarded against, it is the habit of carelessness: the nurse may have become so familiar with the dosage that an error would seem an impossibility, but it is to be remembered that a mistake is always possible. The rule made in the very beginning, and never departed from, should be this—viz. to look at the medicine-label and dose twice before giving any drug—once before it is measured out, and a second time just before administering it to the patient—and never to give a medicine from a bottle or box that is not properly labelled. Nor should medicine ever be recorded as given, before the patient has actually taken it. It may seem more convenient to record it a little earlier, and the intention may be perfectly good, yet this is a rule which under no circumstances should ever be disobeyed.

There are some medicines that act simply upon the surfaces with which they first come in contact—upon the skin if externally applied, or upon the mucous membrane of the stomach or intestines if given internally; but the majority of drugs when introduced into the system are first absorbed into the blood, and by it are carried to the tissues and organs upon which they act, producing certain changes in them. The activity of such drugs depends largely upon the rapidity with which they are absorbed into the blood. There are five paths of entrance for medicines into the circulation: by the digestive tract, the cellular tissue, the rectum, the skin, and the lungs. The route most frequently chosen is by the alimentary tract; the most

rapid, and the one therefore most often employed in emergencies, by the subcutaneous tissue.

Medicines given by the mouth are absorbed partly in the stomach, but to a greater extent, and in a few cases almost entirely, in the intestinal tract. They are given in solution or in the form of powders, pills, capsules or triturates. In giving solutions the bottle is first well shaken, then uncorked, and the dose prescribed is poured into a medicine-glass, and diluted with as small a quantity of water as the nature of the medicine will permit. A dose is often rendered much more disagreeable and nauseating to the patient by the addition of a large quantity of water; sometimes, however, it is desirable to have the preparation well diluted as in the case of potassium iodide. If the medicine is very disagreeable, a small piece of ice held in the mouth just before taking it, will lessen the sensibility of the nerves of taste and render the flavor of the dose less noticeable; or if the medicine be mixed with crushed ice or seltzer water, the same effect may be obtained. To hold brandy, whiskey or hot water in the mouth for a few minutes, or holding the nose while the dose is given, has been recommended. A little cold fresh water or seltzer to rinse the mouth and take away the taste should be given immediately afterward. Oils and fluid extracts are readily taken in capsules; this is the most pleasant way to take castor oil, but if preferred it may be given in a little sherry, brandy, or strong coffee. Thus two drachms of sherry may be placed in a medicine-glass, the rim and sides being moistened with it, and the oil then poured carefully into the center; lastly, another drachm of sherry is poured on the top, and the whole taken in one swal-

low. Another way is to take equal parts of the oil and glycerine and flavor with a few drops of the oil of cinnamon or some other aromatic oil.

Another method is to first let the patient rinse his mouth with water as hot as it can be borne, then take the oil and again rinse the mouth with hot water. Some prefer rubbing the inside of the glass with lemon and adding a few drops of the juice to the oil. For children who cannot take it without vomiting the oil may be emulsified by adding a little milk and sugar and shaking. Castor-oil is best given at bed-time. In giving medicine to an obstinate child the nose should be held firmly enough to oblige the little patient to open his mouth in order to breathe. The nurse watches her opportunity, inserts the spoon, presses the back part of the tongue gently down with it and slowly empties it.

Pills and capsules conceal the flavor of medicines, and are therefore much in vogue, but their action is slower than that of solutions, and patients sometimes have difficulty in swallowing them. Tasteless powders may be given mixed with a little water; those with a disagreeable taste, such as those containing quinine, are wrapped in wafers of rice-paper or enclosed in capsules of gelatine. The wafers come in boxes ready prepared and are about two inches square. One is moistened and spread over a teaspoon; the powder is dropped into the centre, and the wafer folded over it; the spoon is now filled with water, and the bolus having been allowed to slide well back on the tongue, a drink of water is taken. If wafers are not obtainable, a small square of thin tissue-paper will answer the purpose. Gelatine and wafer-paper are dissolved rap-

idly in the stomach. Effervescing powders are always given in from a half to two-thirds of a glass of cold water and taken during effervescence. Insoluble powders, such as calomel or acetanilid, should be placed on the tongue and washed down with a drink of water. If a patient be very ill or if it is difficult to get him to take his medicine, the admixture of a little milk or glycerine with it will often enable him to swallow it. In giving pills one must always be sure that they are freshly made up, as they are apt to become hard and dry from standing, and then will not dissolve, but be carried through the alimentary tract without producing any effect. Compressed pills are free from this objection and dissolve readily. In giving a pill it is placed far back on the tongue and followed quickly by a drink of water. If the patient cannot swallow it, as happens in some cases, more especially with children, the pill may be concealed in a small piece of bread or jelly, but if this method does not answer it may be crushed up and given as a powder. Force should never be used in giving a pill to a child as there is danger of pushing it into the larynx.

It is convenient to give some medicines in the form of triturates or tablets. By trituration we mean the grinding and rubbing of solid substances until they are finally pulverized. They are prepared by adding sugar of milk or sulphite of soda in certain proportions to the drug and triturating thoroughly. For convenience in pressing into tablets the powder is mixed into a paste with weak alcohol, the latter being subsequently allowed to evaporate.

The word "subcutaneous" (from the Latin, *sub,* under, and *cutis,* the skin) and the word "hypodermic"

(from the Greek ὑπὸ, under, and δέρμα, the skin) are identical in meaning. By *hypodermic* or *subcutaneous medication* we mean the giving of drugs by injecting them under the skin. The chief advantages of this method consist in the rapidity with which absorption takes place and in the avoidance of gastric disturbances; a drug that takes fifteen or twenty minutes to act through the stomach will require only five, perhaps, when given by hypodermic injection. Usually only solutions of the active principles of drugs are given in this way (*e. g.* solutions of morphin), but other drugs, such as whiskey, brandy, or ether, are sometimes given hypodermically when rapid stimulation is necessary. The injections are given with a fine syringe to which a hollow needle is attached. Three points must be kept in mind in hypodermic medication: First, we must have the needle absolutely clean; secondly, we must have a pure solution for injection; and thirdly, the needle should penetrate only the fleshy parts of the body, avoiding blood-vessels, nerves, and bones. If one be careless about having the needle perfectly aseptic, virulent germs may be introduced and find a suitable nidus for development in the surrounding tissues; and if they grow and multiply, the result may be inflammation and at times abscess-formation. If the solution is not sterile, of course the same danger exists. With proper care the risk with hypodermic injections may be reduced to a minimum. If injections are given in the line of superficial blood-vessels, the fluid may enter a vein, and the drug, being carried directly to the heart, may reach the nerve-centres in concentration in a few seconds, producing alarming symptoms. If injected over a bony promi-

nence, the bone may be injured; so one always selects the outer side of the arms, thighs, or hips, or the abdomen as the place for an injection. The solutions are generally arranged so that the doses vary from one to fifteen minims, the latter quantity being usually the outside limit except in the case of stimulants (whiskey, brandy, and ether), of which a syringeful is given at one time. Before giving a "hypodermic" the skin is to be cleansed with absolute alcohol, the syringe loaded with the number of minims ordered, and all the air expelled by pointing the needle upward and gently pressing the piston until a small drop appears at the point. All being now ready, a fair-sized fold of skin is pinched up between the thumb and finger of the left hand, and the needle is inserted quickly in a slanting direction into the tissues for at least half an inch; it is then withdrawn slightly and the fluid injected slowly. The needle is quickly taken out and a clean pad is pressed lightly over the spot to prevent the fluid from escaping: very gentle rubbing upward assists in the distribution and consequently in the absorption of the fluid, but if at all painful to the patient, this need not be practised. There are various methods in vogue for preparing hypodermic needles for use. The three principal ones are:

First: To pass the needle through an alcohol flame just before inserting it. This method undoubtedly renders the needle sterile, but it is objectionable, because it blunts it, and makes its insertion more difficult, and hence more painful to the patient.

Second: To soak the needle for a few minutes in a 1:20 carbolic solution, and afterward in sterilized normal salt solution or absolute alcohol to remove the

carbolic acid. This of course must be done before the syringe is loaded.

The third and best way is to boil the needle for a few minutes in simple water or in a 1 per cent. soda solution, taking care that after being boiled it is not touched with anything but a clean piece of sterilized gauze, with which it can be held while being attached to the syringe. If no better facilities be at hand, when required for use the needle may be put in a tablespoonful of water and boiled over an alcohol or gas flame.

To clean the instrument before putting it away, it is washed in water and hot water is drawn through it. If in frequent use the syringe and needle may be kept in a 1:20 solution of carbolic acid.

The substance to be given must be completely dissolved and the solution freshly prepared, since one that has stood for some time is liable to be decomposed, and may have a sediment in it which will render it totally unfit for use. The principal drugs used hypodermically are now made up in the form of compressed tablets, with the help of which one is enabled to make a fresh solution at a moment's notice. A tablet should be dissolved in a sufficient quantity of distilled or boiled water. A teaspoon is probably the most convenient thing to use, as from it every drop of the solution can be easily taken up, so that no portion of the alkaloid will be lost and no smaller dose given than is ordered.

Injections of normal salt solution have become firmly established as a therapeutic agent and are now used extensively. Intravenous infusion and hypodermoclysis or subcutaneous injection are the procedures usually employed, the latter being the more common. In a general hospital a supply of sterile normal salt solu-

tion should always be ready. The apparatus consists of a graduated jar with a glass nipple projecting from the side near the bottom. To this is affixed about six feet of sterile rubber tubing, which in turn is attached to a moderate-sized aspirating needle. These should always be sterile and ready for use. The most common places chosen are the loose tissues beneath the breasts, the abdomen, or the buttocks. To save the patient unnecessary pain a one per cent. solution of cocaine may be employed. The salt solution having been allowed to flow through the tube and needle until all the air has been expelled, the needle is inserted and usually kept in place by straps of adhesive plaster. The solution is allowed to flow in by gravity, the flask being elevated only about 4 or 6 feet. The strictest aseptic precautions are imperative. The skin of the patient and the hands of the nurse must be prepared as for a surgical operation. From 500 to 1000 cc. are usually given at one time. The temperature may range from 116° to 118° F., a thermometer being kept in the jar and the latter being swathed in flannel to preserve the proper degree of warmth.

For *intravenous infusions* similar preparations are made. The temperature of the solution should be 101° F. A bandage having been firmly put on the arm on the side remote from the heart, a vein is laid bare and incised. Instead of the needle a small glass canula is used. The solution having been allowed to flow through the tube and canula until all the air has been expelled, the canula is inserted into the vein and securely ligated to it. The tube is clamped with moderate tightness so that the solution runs in very slowly.

Medicines are given by rectum only when it is de-

sired to obtain local effects or where the stomach cannot retain anything or must have its work lessened. The mucous membrane of the large intestine does not absorb quickly, and as a rule requires twice as long to do so as the stomach. For a stimulating effect medicines should therefore be given in solution, and injected as high up as possible in the manner described in the chapter on Enemata.

Suppositories are solid conical preparations, made generally of cacao butter, with which the drug is incorporated. They are firm and should not melt at the temperature of the air, but when introduced into the rectum or vagina will gradually dissolve. They are usually ordered for their local effect, the most common perhaps being those containing some preparation of opium, which is much used in this way as a local sedative. The suppository is first oiled and then slipped in without force: the patient should lie on the left side, and care must be taken that it be made to pass beyond the internal sphincter muscle: the anus may be pressed with a towel until any desire to expel the suppository has passed away.

The practice of introducing medicines into the system by *inunction* is relatively rare. But in some conditions the rubbing in of various substances is sometimes ordered; in syphilis mercurial inunctions are often indispensable. The ointment is to be well rubbed in. The areas generally utilized are the axillary spaces, the inner surfaces of the thighs, the chest and abdomen. Again, in conditions of emaciation such as are seen in tuberculosis and inanition from other causes, cod-liver oil used in this way is frequently of

value. Before an inunction is given the circulation of the skin is rendered active by a warm bath.

To obtain absorption through the lungs it is necessary to finely subdivide the medicament by means of atomizers or insufflators, and give it by inhalation. Although the spray from an atomizer is most commonly used, the inhalation of vapor is also a favorite method. The drug should be mixed in hot water in a small steam kettle that can be kept over a lighted gas or alcohol lamp with a flame just large enough to allow a small stream of steam to pass constantly through the spout, over which the mouth is held at a comfortable distance. Or the drug may be mixed with a quantity of boiling water sufficient to about half fill a quart bottle, which is wrapped in cotton-wool to preserve the heat, and the vapor breathed in. Volatile drugs like ammonia or eucalyptus, chloroform and ether are poured on a sponge or cloth, and held near the nostrils or placed in a respirator which covers the mouth. If an irritating substance is used, with unconscious patients great care is required to see that it is not held near enough to do any injury. Nitrite of amyl is best inhaled from a small piece of fine linen or handkerchief.

For the local application of powdered substances the regular rubber insufflator is used; or the powder may be put into a glass tube or quill placed well back in the throat and gently blown in or else drawn in by the patient. Liquids are applied by means of the gargle, spray, swab or syringe. Of these the spray is most often employed, as the solution is converted into a fine cloud of spray which reaches every affected part. For removing an accumulation of mucus in the throat

the swab is preferable. This is made by twisting absorbent cotton on a long probe or applicator. It is then dipped in the solution and applied to the throat with a circular movement of the wrist.

It is necessary for a nurse to understand the effects of the drugs in common use and to recognize the ordinary indications for their discontinuance. She should also be familiar with the maximum and minimum doses of drugs, and the symptoms following an overdose, remembering always that variations from the rule exist for individual cases and according to special circumstances. Thus the nature of the disease, the age of the patient, his temperament and habits, the time of administration—all influence the action of remedies. Children require much smaller doses than adults, and the old have less resisting powers than the middle-aged for depressing drugs. The most generally accepted rule by which to calculate the doses for children under twelve years of age is as follows: Make a fraction, the numerator of which is represented by the age of the child in figures, the denominator by figures representing the age of the child with twelve added. This will represent the part of the adult dose which is required. Thus, for instance, for a child six years old we have $\frac{6}{6+12} = \frac{6}{18} = \frac{1}{3}$ of the adult dose.

Roughly speaking, we may say that between the ages of twelve and twenty-one the dose is one-half of the full dose. Exceptions to the above rule are made in the case of purgatives like calomel or castor oil; of these half an adult dose may be given to children. With opium, however, a smaller dose than the rule

calls for should be given at first, since children are very susceptible to this drug, while on the other hand, they are very tolerant of belladonna.

As physicians cannot always speak of the details of the action of medicines to each nurse, it is necessary in giving drugs to bear in mind some of the results which may follow their use. Thus a drug may not act in the same way with every one. Some people have an idiosyncrasy in regard to a particular medicine, by which we mean that it affects them in some peculiar way that would not ordinarily be expected. This is particularly true of individuals with highly nervous temperaments; and, since such an effect cannot always be foretold, nurses should be very careful to note the symptoms following the first dose of a medicine. Where an idiosyncrasy exists, the susceptibility to the drug will probably be increased, and peculiar symptoms may manifest themselves with the first dose, which should be reported to the physician. In such cases the dose should not be repeated without further instructions. Again, certain medicines, if given regularly for some length of time, gradually accumulate in the system until finally marked symptoms of poisoning appear. With such powerful drugs as strychnine this *accumulative* effect must be watched for. On the other hand, there are other medicines to which, when given for some time, the system becomes accustomed, so that the dose may have to be increased to obtain the desired result. When this *toleration* becomes established, the increase in the dose may go on until the *habit* of taking the drug is acquired, and the patient thinks he cannot do without it, as is so frequently seen with opium and its alkaloid morphin. Whenever unusual symptoms of any kind

have become at all evident as the result of treatment, the nurse must be particular to keep the physician informed, as often only through her can such occurrences be detected, and she should understand the symptoms which may follow the use of the various drugs. Frequently, where a habit is becoming apparent, a placebo is resorted to in order to quiet the mind of the patient, but the custom is to be deprecated from a moral standpoint, and no nurse should resort to hypodermics of water or salt solution or any of the various substitutes without direct orders from the physician.

The time to give medicines must be carefully considered. Absorption is of course more rapid when the stomach is empty, and if a prompt action be desired a time is selected when the stomach is not filled with food: for this reason purgatives, which act quickly, are usually ordered in the morning an hour before breakfast: more slowly acting cathartics are taken at night; irritating or acid substances should be given when there is food in the stomach, and certain other drugs only at a time when the process of digestion is most active. Alkaline tonics may be given before meals; narcotics should be given the last thing after the patient has been prepared for the night, and nothing should be done to rouse or disturb him after the drug has been taken.

Some forms of food and medicine do not combine well—that is, they are incompatible; thus, for instance, if milk and acids are given together, the milk is apt to be rejected or to cause pain. Some drugs are also either physiologically or chemically incompatible with

others; thus corrosive sublimate is incompatible with all albuminous bodies, and should be given alone.

Medicines ordered before food should be given from twenty minutes to half an hour before the meal-time; those ordered after meals should be given either immediately after eating or fifteen minutes later. Medicines ordered for a certain hour should be given promptly at that hour: three o'clock does not mean five or ten minutes before or half-past three; and it is not the privilege of the nurse to administer a medicine before or after the hour marked on the schedule. Unless special orders are given, it is generally understood that a patient is not to be awakened for medicine at night. One should not attempt to give an unconscious patient medicine by the mouth, for it may enter the larynx and cause suffocation, or an aspiration pneumonia.

In hospitals, accurate lists should be written out by the head nurse with the names of patients, medicines, doses, and hours conveniently arranged, and one nurse should be set apart and held responsible for their prompt and correct administration. A nurse under no circumstances should take upon herself the responsibility of suggesting or prescribing a medicine. If consulted as to what it would be best to give, she should always refer the consultant to the physician in charge.

Medicines for hospital use should be ordered only in small quantities—not enough to last three or six months—since it is always best to have them fresh. They are liable to evaporate, and the solutions may become more concentrated when allowed to stand on the shelves, and, as supplies can be ordered daily, there is no necessity for having too much of anything on

hand. The medicine-closet is not to be converted into a small drug-shop; unused drugs must not be allowed to accumulate in it, but should be returned to the hospital pharmacy, as they may possibly be used in another ward, and thus expense be saved.

The *medicine-closet* for hospital use is usually made with glass doors, and should be kept scrupulously neat. If heavy glass shelves cannot be had for the bottles, it is easy to cover the wooden shelves with sheets of ordinary glass cut to fit; these will prevent stains on the wood, and the closet with but little trouble can be made to present a neat appearance. The size of the bottles should vary according to the drugs which they contain. All extracts, active principles, and powerful drugs should be kept in very small quantities in bottles holding no more than two ounces, and each should be supplied with two labels, on one of which the name of the drug and the strength of the preparation is clearly shown, another, a bright red one, being marked "Poison." The same precaution should be used with external applications, and the bottle should be of glass of some striking color and have a rough surface, so that the moment the fingers touch it it will be recognized as one containing a poisonous substance. If the medicines be always poured out on the side remote from the label, the latter will not be disfigured and will not be so liable to be rubbed off. Where many medicines are given, a small damp cloth should be kept to wipe the bottle before it is returned to the shelf; of course all bottles must be carefully corked to prevent evaporation. A small tray, a pitcher of fresh cold water, a glass rod for stirring, glass tubes for mixtures which would injure the teeth, a dropper, and

plenty of graduated medicine-glasses ought to be kept near the medicine-closet. No one but a nurse should perform the duty of giving out medicines in a free ward, and a drinking-glass after having been used by one patient should be carefully washed before being given to another. After use the medicine-glasses are washed thoroughly with hot water and soap, those that have been employed for oils or emulsions being washed separately: the nurse should never entrust this work to a convalescent patient. Small medicine towels made of old linen napkins or table-cloths are necessary. The medicine-closet should always be kept locked, and on no consideration should a patient (no matter who he be) have access to it.

A nurse should practise the reading of prescriptions and understand their component parts. As a rule a prescription is made up of four parts (1) the superscription—the letter R, an abbreviation for Recipe, the imperative mood of the verb Recipio: (2) the inscription—the names and doses of the drugs prescribed: (3) the subscription—directions to the dispenser: (4) the signature; instructions to be written in English for the patient. In a typical prescription the ingredients are, the basis or active ingredient; the auxiliary; the corrective; and the vehicle.

Abbreviations.

āā, ana (ἀνά) of each.
Abstr., *Abstractum*, abstract.
Ad, up to, to amount to (the full phrase being quantum sufficit ad).
Addc, add.
Ad lib., ad libitum, as much as desired.
Alt. hor., alternis horis, every second hour.
Alt. noc., alternâ nocte, every other night.
Aq., aqua, water.
Aq. dest., aqua destillata, distilled water.
Aq. pur., aqua pura, pure water.
Bis. ind., bis in dies, twice daily.
C., *Cong.*, congius, a gallon.
c., cum, with.
c. c., cubic centimeter (commonly written *cc.*).
Cap., capiat, Let him take.
cm., centimeter.
Comp., compositum, compound.
Conf., confectio, a confection.
Contin., continuatur, Let it be continued.
Decub., decubitus, the lying-down position.
Det., detur, Let it be given.
Dil., dilutus, dilute.
Dim., dimidius, one-half.
Div., divide, divide.
Div. in p. æq., dividatur in partes æquales, Let it be divided into equal parts.
Drachm., drachma, a drachm.
Emp., emplastrum, a plaster.
Enem., enema, injection.
F., Fahrenheit.
F., fac, make.
Fl. Fld., fluidus, fluid.
Ft., fiat or fiant, Let there be made.
Garg., gargarisma, a gargle.
Gr., granum or grana, a grain or grains.
Gtt., gutta or guttæ, a drop or drops.
Guttat., guttatim, drop by drop.
Inf., infusio, an infusion.
Inject., injectio, an injection.
Lb., libra, a pound.
Liq., liquor.
Lot., lotio, a lotion.
M., misce, mix.
Mist., mistura, a mixture.
N., nocte, at night.
No.. numero, in number.
O., octarius, a pint.
Ol., oleum, oil.
Ol. res., oleoresina, oleoresin.
Ol. oliv., oleum olivæ, olive oil.
Ov., ovum, an egg.
Pil., pilula, a pill.
P. r. n., pro re natâ, as occasion arises.
Pulv., pulvus, a powder.
q. s., quantum sufficit, as much as is sufficient.

R., recipe, take.
Rad., radix, root.
S. or *Sig.*, signa, write—*i. e.* Give the following directions.
Sem., semen, seed.
Sp. gr., specific gravity.
Sp. or *Spir.*, spiritus, spirit.
Ss., semissis, a half.
S. V. R., spiritus vini rectificatus, alcohol.
S. V. G., spiritus vini gallici, brandy.
S. F., spiritus frumenti, whiskey.
Syr., syrupus, syrup.
T. i. d., ter in die, three times a day.
Tr., *Tinct.*, tinctura, tincture.
Troch., trochisci, lozenges.
Ung., unguentum, ointment.
M, minimum, minim, the 60th part of a drachm by measure.
ʒ, drachma, a drachm.
℥, uncia, an ounce.
℈, scrupulum, a scruple, = 20 grains.

Apothecaries' Weight.

20 grains = 1 scruple.
60 " = 3 scruples = 1 drachm.
480 " = 24 scruples = 8 drachms = 1 ounce.

Apothecaries' Measure.

60 minims	=	1 fluidrachm.
8 fluidrachms	=	1 ounce.
16 ounces	=	1 pint.
2 pints	=	1 quart.
8 pints or 4 quarts	=	1 gallon.

Approximate Measures.

A common teaspoonful of distilled water contains about

60 minims	= 1 fluidrachm	= Fl. ʒj.
1 dessertspoonful	= 2 fluidrachms	= Fl. ʒij.
2 tablespoonfuls	= 1 fluidounce	= Fl. ℥ss.
1 wine-glassful	= 1½ fluidounces	= Fl. ℥iss.
1 teacupful	= 4 ounces	= Oj. oj.
1 pint	= 16 ounces	

Abbreviations of Time for Giving Medicines.

A. C. (Ante cibum) before meals.
P. C. (Post cibum) after meals.
A. M. (Ante meridiem) in the morning, before noon.
P. M. (Post meridiem) in the evening.
q. 1. h. (quaque hora) every hour.
q. 2 h. (secunda quaque hora) every two hours.
q. 3 h. (tertia quaque hora) every three hours.
q. 4 h. (quarta quaque hora) every four hours.

CHAPTER XIII.

DIET IN DISEASE.

The importance of diet and its relation to the needs of the system, whether in health or disease, can hardly be overrated, and to properly appreciate this relation one must have at least a general idea of the constituents of the different varieties of food. The doctor orders what food a patient shall have, but the nurse has much to do with its preparation and administration. It is unfortunate that so few nurses understand anything about food-composition and the principles underlying food-preparation, since for invalids these are of paramount importance. In hospitals it not infrequently obtains in the nurse's mind that if any one part of her duties may be neglected, it is the attention given at meal-time. It is pretty well understood among nurses that medicines are to be given promptly at the time they are ordered, and any neglect of this duty is considered a grave misdemeanor; but it has not yet become clear to all women who nurse in hospitals that it is equally important that the patient's food should be given at stated intervals, in correct proportions, and in an inviting form. Fresh air, pleasant surroundings, and good food all have a distinct therapeutic value and will do much toward restoring health or improving a patient's condition; and with these a nurse has much to do. In the free wards of hospitals it is not an uncommon thing to leave the distribution of the food

to the ward maid, with but a very hasty or superficial supervision on the part of the nurse: the result is that an overloaded plate of food of various kinds may be carried to a patient who has not the appetite or inclination even for the daintiest morsel; the plate is put down and left during the time prescribed for the meal, and then carried off again by the maid; and it may only be quite by accident that the nurse learns afterward that the patient has eaten nothing. Moreover, such want of thought means not only neglect of the patients but also a wanton waste of good food.

Nor can it be expected that women coming into hospitals, new to the work and to illness, should always realize the importance of this part of their duties unless the fact has been thoroughly impressed upon them. Skill and intelligence in this, as in the other departments of nursing, require that theory and practice should go hand in hand: theory alone will not do, nor will it answer to depend upon chance opportunities to put theoretical teaching into practice. Lectures and demonstrations are better than nothing, but being talked to and seeing the demonstrations of some other person will help the nurse but very little toward performing the work skilfully herself, nor will the principles upon which they are based appeal to her so forcibly as when she can actually see certain results follow in her own experience. But, if she once understands the principles, her attention to the nourishment of the patients under her care is less likely to be a mere perfunctory duty, and, knowing the results which she wishes to obtain, she will be interested in watching for the success of her efforts. Fortunately, the increased

attention given to domestic science in its various branches makes it now possible for training-schools to secure competent instructors in cookery for invalids. The great increase in the number of such instructors now employed in hospital diet kitchens, since the first edition of this book appeared, is in itself a pleasing indication that the subject is receiving more and more consideration. Cooking is a fine art that requires to be studied not only in theory, but also in practice. Instruction in this branch should be given in the hospital diet department, which should be a model of its kind and have as its head a nurse who has been especially trained in the science of nutrition. After the pupil becomes familiarized with the general kitchen and its work with food in quantities and its distribution, she should be detailed for a course of study of foods and the principles concerned in their preparation, the practical part of which should consist in the making and cooking of the various dishes suitable for an invalid's dietary. This course should be conducted by a special teacher in a well appointed smaller kitchen, which should be an adjunct of the larger general one. This study calls for a knowledge of elementary chemistry as far as it applies to the effects of heat, cold, air and water on food, the classification and composition of the principal food-substances, and the process of selecting and preparing such foods in simple palatable forms for invalids. Of the preparations there should be a good number to choose from, and the pupil should go over the tests and actually prepare each dish at least three times.

1. She should assist the teacher in making it, and

be taught the principles to be observed in preparing such a dish;

2. She should prepare it under the observation and criticism of the teacher;

3. She should prepare it, as a test of her ability, quite alone.

As the primary idea is to instruct, the time allowed for such a course should be devoted exclusively to teaching, and since the preparation of large quantities would take too long, and thus hinder systematic instruction, it cannot be expected that all the delicacies for daily use in the hospital can be prepared in the cooking-school. Most of the beef-tea, however, and of the broths needed for the hospital may be made daily, and in addition the dishes prepared during the instruction of the day may be contributed as extra delicacies to the wards. The time required for such a course is at least one month, but a better proportion is six weeks; the class may consist of a regular section of the students taking the preliminary course. A course of this kind gives a nurse an intelligent comprehension of the value of certain kinds of food in disease, and of the best and most wholesome methods of preparing them, so that she will afterward be able to explain to others how the work should be done when she has not time to do it herself. She will have at her command a varied and extensive list to select from, and will be taught the correct manner of serving. If she becomes a district nurse, she will be able to advise the housekeepers or mothers how they may spend small sums of money for food in the most profitable way, and to give valuable instructions how to prepare it.

As a preparation for the position of head nurse in a hospital, such instruction gives her a practical regard for economy, and teaches something about household arrangements—qualities very desirable in a woman who is responsible for the careful ordering of a ward. In the ward a nurse should be detailed in turn for a certain length of time to have charge of the nourishment of the patients: in this way she will know just what each one is getting, and, after serving each patient's food herself, she should then go round to all the bed-patients, encouraging some to eat, finding out their likes and dislikes, feeding the helpless ones, and then making an accurate report to the head nurse of those who have no appetite and do not eat well.

The cleanliness of the refrigerator where the butter, milk, and extra food for the patients are kept should be under the supervision of the nurse in charge of the meals; the work must be done thoroughly to ensure keeping things sweet and free from fermentative bacteria. The milk-jugs and cans require a careful daily washing, after which they are to be left standing full of boiling water for an hour. The greater the pains taken to instruct the nurse as to the reasons why such continuous and strict attention to these details is necessary, the greater the responsibility on her part to see that the proper conditions are maintained.

All dishes used for diphtheria patients or, in fact, for those with any infectious disease, should be kept apart from others, and not put into common use again until they have been boiled in a 2 per cent. solution of carbonate of soda for one hour. The use of the steam dish-washers—now commonly employed in large

hospitals—is to be commended, since in this way all the dishes can be sterilized after each meal.

Sometimes, when a patient is not inclined to eat, a little judicious management on the part of the nurse will result in a fairly good meal being taken: she may do this by assisting the patient to take food, encouraging him to try a little more, or by diverting his mind with conversation that will be of interest, and keeping his attention off what he is doing, so that sometimes he will unconsciously eat a great deal more than if left to himself. Considerable skill is required in administering food to helpless patients. If it has to be given with an ordinary cup or glass, the vessel should never be more than half full, and the head should be slightly raised and supported firmly; care should be taken not to throw the head so far forward as to make swallowing difficult. A napkin is to be folded under the chin and the fluid given gradually; an occasional stop should be made, so that the patient may not have to swallow during inspiration. If feeding-cups are used, glass ones are preferable, as the amount given at one time can be more easily measured. For patients who must lie flat on their backs, a favorite way to give fluids is through a glass tube: an ordinary pipette may be bent at any angle desired by heating it in an alcohol flame, and through it the patient may suck his nourishment without having to be raised. The fluid may be taken in this way as slowly or as rapidly as he wishes, and there is no danger of any running down the outside of the cup on to the clothing; if a glass tube cannot be procured, a small piece of clean rubber tubing will answer, but it should be washed thoroughly after use and kept in a fresh solution of boric

acid. Where the favorable termination of a disease depends upon keeping up the patient's general strength, it is important to give nourishment as regularly at night as during the day, unless orders are given not to waken him. Frequently a patient will become just conscious enough to take what is held to his lips, and at once drop off to sleep again. Patients are apt to lie awake toward morning, when a cup of hot milk, cocoa, or broth should be ready, as this often sends them to sleep again for two or three hours. It is a good practice to give a glass of milk or some light form of nourishment the last thing before a patient is settled down for the night.

Food given to patients in small quantities and at short and regular intervals will digest better than when the same daily quantity is taken in heartier meals at longer intervals, as the function of the digestive organs is weakened, and sympathizes, so to speak, with the condition of the general system. Food of any kind should never be left in a sick-room after a patient has finished with it, nor should it be allowed to remain on the bedside stand in the hope that a little may be taken later. This applies to milk particularly, which is so much used, for it perhaps more readily than any other kind of food absorbs impurities from the air. The drinking-water is not infrequently a source of disease, and intestinal irritation has often been traced to this source, although the water itself may be apparently clear and may look perfectly pure. Where intestinal disturbances cannot be traced to any direct cause, one suspected agent may be excluded by boiling all water used for drinking purposes, and keeping it in clean vessels. The same dangers arise

from the use of impure ice. Where there are epidemics of fevers, intestinal diseases, or cholera, drinking-water should never be taken unless it has previously been boiled.

In private nursing the nurse usually has to make arrangements for keeping small quantities of food or milk for night use near at hand and fresh. Where a small refrigerator is not obtainable, a large dish-pan is a good substitute; the ice may be kept for a long time if wrapped in a piece of flannel and not allowed to come in contact with the water that drips from it. This can be arranged by turning a smaller basin upside down in the pan and putting the ice on it; then the milk, fruit, etc., may be arranged about it, the whole being covered over with a fresh napkin and kept in a cool place.

Food-constituents may be grouped as albuminoids or proteids, fats, carbohydrates, inorganic constituents, and water. A diet to be perfect must contain all these in certain definite proportions. The diet in illness will depend largely upon the nature of the disease, the amount of waste of the tissues, and the forms of food best suited to repair as much of the waste as possible.

The patient's strength is to be kept up, so that he may utilize food to the greatest extent possible to repair or prevent tissue-waste; no food should be given that cannot be readily assimilated.

In diseases accompanied by fever, wasting of the albuminous tissues takes place, and as a consequence muscular weakness results. At the same time there is a disturbance of the processes by which food-substances are digested and absorbed. Albumin is often found in the urine, and the amount of water in the body is

diminished. In the weakened state of the powers of digestion which accompanies fevers, the food which contains those substances which are most readily assimilated, and leave a minimum amount of residue, is desirable, and should be given in liquid form.

Milk is considered the perfect food in these cases, as it contains albumin, fat, sugar, and water, besides inorganic salts of lime and potash. If it disagree with the patient, and curds appear in the stools or vomiting ensue, it may be given boiled, or may be diluted with plain or effervescent water in the proportion of 3 parts of milk to 1 of water, and given in small quantities and more frequently. If it still disagree, it may be diluted one-half with barley-water, or lime-water; or bicarbonate of soda (10 grains to the pint) may be added to it. Where these fail, peptonized milk may be given. When milk is the exclusive diet, of course the amount must vary somewhat for each individual patient, but usually from 3 to 5 pints are ordered for the twenty-four hours; this should be divided up into equal portions, of which one is given every two or three hours. Occasionally milk cannot be taken at all, and where there is much depression the *albumen of egg* in increasing quantities may be ordered.

After a course of nutrient enemata a teaspoonful of albumen water every half hour is a safe way of returning to feeding by mouth. Albumen water is a simple form of nourishment when others fail; in persistent vomiting it is retained in small quantities when everything else is rejected; in typhoid fever, in diarrhœas of children and when incorporated in nutritive enemata it causes less discomfort and irritation than other forms of food. To prepare it the white only of the

egg is taken and well beaten and strained. It can be given in orange juice or with about equal parts of cold water, a small quantity of salt being added and if desired a few drops of lemon juice and a little sugar.

Other substitutes for milk are kumyss, whey, buttermilk, or meat broths, soups, and meat extracts; these do not contain the same amount of nutriment as milk. Unless the process of preserving the albuminoids in the broth is understood and carried out, it is of little value as a food. The broths commonly in use in hospitals serve more as a warm, slightly stimulating drink than as a form of nourishment; the extracts are more stimulating, but are only nourishing to a small extent. Meat-jellies may also be used for administering albuminous foods in an easily-digested form. Farinaceous foods are rarely ordered in fevers, as they readily ferment, and no starchy food is suitable in typhoid fever where the lesions are in the small intestines, since the stomach, upon which we have mainly to rely in this disease, does not digest starch.

The importance of giving plenty of *water* in febrile diseases is now generally insisted upon by medical authorities. The functions of water in the body are various. It is a necessary aid to digestion, as food must be dissolved before it is absorbed, and plenty of water in the circulation helps to carry nutritive material throughout the body. It also conveys the waste products of combustion that must of necessity be carried off in solution. In a condition of fever these waste products are greatly increased while there is a distinct loss of water to the system through the discontinuation of the regular food which ordinarily would contain about a third of the normal daily amount

of water taken into the body. Hence it is clearly necessary to give plenty of water to make up the normal quantity and in addition a great deal more is needed to help to perform the extra work imposed upon the system in febrile conditions. If a patient does not ask for it, it should be offered to him, and he should be induced to take it frequently: some advocate giving it as often as every hour during the day if it does not interfere with digestion. In typhoid fever the nurse is now told to induce the patient to drink as much water as possible. A fresh supply is kept constantly by the patient's bed and he is encouraged to take some every fifteen minutes. Cold water when taken at frequent intervals, will lower the temperature somewhat, flush out the kidneys, and assist in carrying off waste products from the alimentary canal. It may be alternated with effervescing waters, lemonade, rice-water or barley-water. A little fresh cold water or Seltzer should always be given after milk or food. It removes the particles that cling about the teeth and fauces, and does away with the continuous and disagreeable flavor of food.

Tea and *coffee* are sometimes ordered in fever as slight stimulants. Some form of *alcohol* is ordered when it is necessary to assist in checking tissue-waste; When the pulse becomes dicrotic, rapid, and irregular, the tongue dry and parched, and the nervous symptoms are marked, *alcohol* may be the only thing which will bring the patient through.

A convalescent fever patient is allowed to return to solid food by degrees, beginning with so-called light diet, under which head are included baked custards, jellies, soft-boiled eggs, and milk-toast; then extra

diet is allowed, when fowl, chops, baked potatoes, etc., may be cautiously given. The above course of diet is that usually prescribed in typhoid fever. In some forms of febrile disease, as pneumonia and tuberculosis, where no part of the alimentary tract is involved, the "light" form of solid diet may be given even when there is pyrexia; in tuberculosis, in fact, any food that is nourishing and easily digested is usually allowed, being supplemented by forced feeding with fresh eggs and milk.

In diseases where fever is not a prominent symptom, and where the effects of certain foods upon the disease must be taken into account, special forms of diet are prescribed.

In *acute gastritis* the giving of food by the mouth may be stopped entirely, so that complete rest is afforded to the stomach, while the nourishment is administered by means of nutritive enemata. In the milder forms peptonized milk is often ordered or egg-albumen diluted with water, and the way is paved to solid food by the use of scraped raw beef in small quantities. Fats, starches, highly-seasoned foods, and stimulants are to be avoided, and are not to be given except by the physician's orders.

In *dyspepsia* easily assimilated foods are ordered in small amounts and at fixed intervals; hence the importance of giving them promptly and in the precise quantities directed.

In *chronic gastric catarrh* begin with milk in small quantities and gradually increase in amount; this may be followed later by freshly pulverized raw meat or meat extract, preferably a clear consommé to which an egg may be added. All fats, spices. an excess of

starchy or saccharine food and stimulating drinks should be avoided. Many patients will improve under these circumstances, but it is often necessary to adhere to a strict diet for life.

In cases of *gastric ulcer* there is a localized gastric catarrh and the coats of the stomach are unfitted for digestion. Give the mildest and most unirritating food. A bland but nutritious diet should be maintained for months after all symptoms have disappeared.

In gastric cancer there is not so much disturbance of the digestive powers when the growth affects the larger curvature of the stomach, as when the pylorus is implicated. In the latter case if much food is taken it will accumulate in the stomach, ferment, and produce distention. Washing out the stomach is an important adjunct to the dietetic treatment in such cases. In diarrhœa caused by improper food or food in too large quantities, the diet must be restricted. Milk well boiled is the best food until the condition improves, when pulverized meat or meat infusion may be tried. Absolute rest in bed is very necessary.

In diseases of the kidney a diet consisting of milk and vegetables, together with plenty of water, is generally prescribed.

In diabetes or glycosuria sugar appears in the urine, and there are great emaciation and loss of strength. In transitory cases caused by an excessive use of sweets, a proper regulation of the diet will soon bring about a disappearance of the symptoms. Glycosuria is not uncommon in gouty individuals.

In true diabetes all foods or liquids which contain sugar or anything that can be converted into sugar, as starch and allied substances, are reduced to a min-

imum. Gluten bread is ordered instead of white bread, as, if properly made, it contains a minimum of starch.

Saccharine has the taste of sugar, with 300 times its sweetening power, but not its injurious effects. Potatoes, when eaten at all, should be baked. If light wines are not available, diluted spirits in small quantities are allowed, for the reason that they assist in the digestion of fats.

Unless a convalescent expresses a preference he should not be consulted as to what food is to be served, nor should it be mentioned until it is actually before him. All nourishment should be given punctually and at the right temperature; nothing should be forgotten. Too large a quantity should never be served. The tray and everything on it should look clean, dainty and attractive. Attention to all such details will assist materially in putting the patient in a proper frame of mind for food. No food should ever be cooked in a patient's room and anything left over should be removed at once.

Artificial feeding includes the giving of nourishment by the rectum by means of nutritive enemata, described in the chapter on enemata, gavage—the giving of food through a tube passed through the mouth or nostril to the stomach—feeding by subcutaneous or intravenous injections and through a gastric fistula.

In the case of children, where only a very small amount of fluid nourishment is needed, or when adult patients keep the teeth tightly clenched, a medicine dropper can be employed with advantage.

The nasal tube is usually indicated in unconscious or insane patients, in diphtheria when excoriations of the mouth exist, and in cases of tetanus.

It is often difficult to induce children with sore throats to swallow food, and if tact and perseverance fail to bring about the desired results the nasal tube must be resorted to. Older patients can be made to hold pieces of ice far back in the throat until a condition of numbness from the cold is produced, after which liquid food can be taken with little or no pain. Cocaine is sometimes ordered to be painted on the fauces before nourishment is given.

It need hardly be added that we have always to take into consideration the exigencies of the particular case with which we are dealing, and, while following general principles, be prepared for such modifications in details as may be indicated. The patient's physical comfort should be looked after; before food is given the mouth should be washed out, the face and hands bathed, the bed cover and pillows arranged; the patient should be propped up, with his shoulders well covered but the arms free, and everything disagreeable, as, for example, the sputum cup, should be put out of sight.

CHAPTER XIV.

How to Observe, Report and Record Symptoms.

It is essential for a nurse from the beginning of her hospital work to cultivate the faculty of observation. In this not only the eyes, but also the hands, the ears, and even the nose, should all have a part, and this quality should extend not only to the particular symptoms of her patients, but to every detail of the work pertaining to their welfare. In her first month in a hospital the beginner will probably succeed only in becoming familiar with her surroundings, a few nursing appliances, and some of the minor steps in nursing; and with the multitude of new duties which press upon her it is unlikely that she will be able to get any very clear ideas about the individual patients and their diseases. In her second and third months a more definite conception of her duties to the patients will gradually open up to her, and any general symptoms or conditions common to all sick people will one by one present themselves to her notice, to be followed gradually by symptoms or conditions peculiar only to individuals or to particular diseases. Not all the observations concerning patients that a nurse must necessarily be conversant with can be grasped immediately; they are only acquired through constant contact with illness, much practice, and the application of the principles which have been taught to her with reference to diseases and their phenomena. To some, who are en-

dowed with quick instincts and keenness of perception, this knowledge comes much more readily than to others, who can acquire habits of observation and accuracy of statement only by patience and perseverance. In the observation of symptoms there are three rules that a nurse should never lose sight of:

1. She should always observe minutely and accurately the condition of her patient;
2. These observations should be made according to a regular system and method;
3. She must learn to express the results of such observations in a clear and concise form, both orally and in writing.

It is very important that these three rules should be daily carried out in practice, as it is upon the nurse that the physician must for the most part depend for accurate statements regarding the condition of the patient during his absence. Frequently such observations will assist him materially in making a correct diagnosis and in the treatment of the disease. As we said before, the reports should be given in a systematic, clear, and concise form; they should contain an exact but simple statement of facts as they present themselves, without any attempt at offering opinions or suggestions. A well-trained nurse is never guilty of attempting the diagnosis of a disease, even when invited to do so. Her manner should be quiet and matter-of-fact, and she should not be too ready to take unto herself any undue credit for doing only that which it is her duty to do. Her own work will also be made easier for her in proportion to her ability to distinguish grave symptoms from unimportant ones, since she will frequently be placed in a position where she must de-

cide whether the symptoms are sufficiently serious to require the calling in of a physician at an inconvenient time, or whether the instructions already given are sufficient to meet the requirements of the case.

Symptoms are either *objective,* those outward indications or signs observed independently by the physician, nurse, or any one under whose notice the patient comes, or *subjective,* those complained of by the patient or elicited by inquiry from him. Both subjective and objective symptoms must be remembered, but the patient's statements cannot always be fully relied upon, as ill people sometimes imagine their condition to be worse than it really is, and exaggerate their ailments, while clever malingerers, who are only feigning illness, are never at a loss for a pain or an ache. These statements, however, must be reported just as they are given by the patient, as it is for the physician to decide which of the symptoms are real and which are simulated. In small children objective symptoms are relied upon almost entirely.

In a hospital the observation of a case should begin immediately after a patient comes under the nurse's care, and be continued during all the time he remains under it. The time may be divided into three periods: (1) that immediately following his admission; (2) that during which he is confined to bed; and (3) that of convalescence.

The first thing to be noted is the general appearance, whether the patient seems very ill and in great suffering, or whether the indisposition is apparently only slight and not alarming. Besides this, attention is given to the sex, color, and approximate age, then to the manner or disposition, whether the patient seems

to be quiet and orderly or rough and inclined to be troublesome; any indications of weakness, such as inability to walk, awkwardness, or peculiarity of gait, should be noted, as well as any signs of deficient power in the trunk or in the arms. In examining into the condition of the mind we note whether the patient is conscious or unconscious, rational or irrational, depressed or hilarious, or whether he shows any signs of intoxication or delirium. The speech, too, should be observed: it may be "thick" or "clear," or there may be hoarseness; again, the patient may mutter or give vent to loud screams, according to the form of the delirium. The face and special senses are also very interesting; thus the color of the skin may be bluish (cyanosis), pale, or jaundiced; the expression may be one of pain; the eyes are to be looked at particularly to see whether the pupils are dilated or contracted, and whether they are equal or unequal in size.

The pulse and temperature may be taken while these symptoms are being observed, and it should be remembered that all these points are to be noted in a quiet, unobtrusive manner, and as far as possible without the patient's knowledge. When the patient first enters the hospital any peculiarities of manner are apt to be exaggerated, and, as we said before, the registered pulse and temperature, owing to excitement and fear or to the unusual exertion necessitated by traveling, may not give us entirely reliable information. A nurse should do everything in her power by gentleness and attention to put a new patient at his ease, and in doing so she may very soon gain his confidence and learn important facts about his previous history that other-

wise might not be found out either by herself or the physician. These first observations occupy only a few minutes, as a nurse familiar with her duties can pass from one detail to another with rapidity.

Further observations are made during the patient's bath, whether given in the tub or in bed, and before he is put to bed his weight should be taken. When in bed the general condition of the body is ascertained, and the existence or extent of any deformity, of obesity, emaciation, or œdema is noted; the condition of the skin is next observed, whether it is hot and dry or cold and clammy, etc., or whether there are signs of any eruption, of bed-sores, ulcers, or any old or recent scars. Where such an examination is possible we should not fail to look for any peculiarities relating to the thorax or abdominal organs. The position the patient assumes, the extent and seat of any pain complained of, nausea or vomiting, cough, expectoration (its nature and amount), are all important. Some information on these points must be ready for the physician on his first visit if he asks for them. In an hour or so after a patient has been put to bed and is quiet and composed, the pulse, temperature, and respiration should be taken again, as they are now likely to afford more reliable information than on admission.

The daily symptoms of a bed patient that must necessarily be noted may be best observed in connection with the different systems of the body, particular attention being paid to those which are more especially implicated, but all incidental manifestations must also be taken into account. The position which the patient assumes, the expression of his face, restlessness, complaints of pain, the occurrence of hæmorrhage, rigors,

any elevation of temperature, the condition of the pulse and respiration, as well as signs pointing to disturbances of any of the special senses,—all must be recorded. Not all these, of course, need be mentioned in every case, but it is necessary that a nurse should understand something of the significance of each when unusual symptoms make themselves manifest.

The *position* in bed is of importance, as by it our attention is often drawn to the organ affected, since the patient usually chooses, sometimes involuntarily, the position which causes the least pain and discomfort. In diseases of the heart or respiratory organs, where there is difficulty in breathing, a sitting posture may be preferred, or if one lung is affected the patient will sometimes lie on that side in order to give the normal lung as much freedom as possible, so that it may be better able to meet the increased work it is called upon to perform.

Dyspnœa, or shortness of breath, occurs in various conditions, particularly in diseases of the lungs and bronchial tubes, and almost always in diseases of the heart, when the circulation in the lungs is impeded. Shortness of breath is often a prominent symptom in certain stages of Bright's disease, and relieved breathing is usually indicated by the patient's ability to lie down without a sense of discomfort or distress.

In *abdominal diseases* the patient may lie on the side, with the knees drawn up to relax the abdominal muscles and thus relieve pressure; for this reason where there is severe pain from *peritonitis* the patient will generally prefer to lie on the back with the knees drawn up, keeping as still as possible, since every motion causes intense pain; in colic the patient is restless

and turns frequently, preferring, however, for the most part, to lie on the abdomen, since he finds that pressure relieves the pain. Usually in fevers, as in typhoid fever, the patient, if not delirious, lies quietly on his back, and is passive when turned from side to side; any attempt to move himself of his own accord is to be regarded as a favorable symptom. Where there is very great pain the patient is apt to be quiet, fearing the slightest movement, and in conditions of great weakness no effort is made to change the position. In some nervous diseases there may be continued restlessness, and no position is comfortable for any length of time. As a fatal termination approaches, this sign is often very striking, being shown more especially by movements of the head, hands, and feet; but this form is quite different from the ordinary restlessness of illness, and is accompanied by other more important symptoms.

Pain.—Where there is a complaint of pain, as far as possible its nature and seat should be determined. Pain may be general or strictly localized; it may be continuous or come on in paroxysms. It may be dull and boring, or sharp, shooting, and throbbing. At the same time, as we have said, the condition of the pulse, the expression of the face, and the position of the patient in bed, should be noted and any further symptoms recorded.

The *appearance* or *expression of the face,* to which we have more than once referred, should become a study to the nurse, for, coming as she does in contact with so many different people, she will find it of great use to be able to interpret correctly the different expressions of the countenance both in health and dis-

ease. Paleness of the face in an invalid, coming on suddenly, may be associated with faintness from hæmorrhage or some other serious cause, while a gradually increasing bluish appearance about the nostrils, lips and cheeks, is indicative of imperfect oxygenation, depending on some interference with the respiration or circulation. Its duration and degree should be noted. A "drawn" appearance about the lips and mouth accompanies nausea, and excess of blood in the head is shown by a deeply-flushel, almost purplish-red color of the face. In pulmonary diseases there may be a characteristic flush or red spot on one cheek, not infrequently on the same side as the affected lung. Besides these, there are tints peculiar to certain diseases. Thus we have often a waxy-white hue in Bright's disease, the bronzing in Addison's disease, the yellow skin in jaundice, the sallow complexion of opium *habitués,* and the dry, flushed face in fevers. The rash of some eruptive fevers appears first on the face, and its general appearance, extent, and color should be observed.

The *expression* may be indicative of marked changes in the course of the disease. A pinched, anxious look is often associated with a grave prognosis, and a dull, apathetic, expressionless countenance, like that so often seen in typhoid fever, is often significant of a serious illness. On the other hand, after the crisis of the disease is passed the patient will often show by his calm and placid look that a marked improvement has taken place. Where there are any signs of paralysis or impairment of the mental faculties, the nurse should note whether both sides of the face are alike, or if the mobility is confined to one side or if one corner of the mouth is puffed out during expiration.

A *rigor* or *chill* is sometimes the first indication of an oncoming illness; it is an important symptom and must always be reported. The duration and intensity of the chill may vary greatly, from a slight subjective feeling of cold, lasting only a few minutes, to a pronounced fit of involuntary shivering, which may last for half an hour or more, and during which, in spite of all efforts to keep his body still, the patient is shaken, sometimes so violently as to move the bed on which he is lying. During this time the body may be externally cold and the face, lips, and finger-tips blue. The temperature should always be taken during a chill, and again half an hour after the chill has ceased; during and after a severe chill there will probably be hyperpyrexia. These paroxysms occur in malarial fever (when they may be severe and recurrent), at the beginning of other fevers, and in acute inflammations. When they occur in the course of any illness except malaria, they indicate the probable existence of some complicating process. The nurse should always record the time at which a chill occurs, its duration, the degree of severity, and the patient's temperature during the paroxysm and after it has passed off.

In a case of *hemorrhage* the source of the bleeding should be investigated, as well as the appearance of the blood, its color, whether it is fluid or coagulated or mixed with other substances, such as food. The quantity of blood lost should always be estimated.

The *number of hours a patient sleeps* should be recorded in the written report, as the administration of narcotics will depend upon the amount of sleep observed by the nurse; a patient's own statements are often very unreliable on this point. One should de-

scribe whether the sleep is quiet or disturbed and restless, whether the patient sleeps lightly and is easily wakened, or whether he is aroused with difficulty.

The temperature, pulse, and respiration are always the chief guides, however, and they have been considered by themselves elsewhere.

The condition of the tongue is an important symptom, as almost all diseased conditions have some action, direct or indirect, upon it. It may be pale and flabby, having marks of the teeth upon it, or bright red; or, again, it may present the appearance which is described as the "strawberry tongue" of scarlet fever. If the tongue is coated with fur, the color may be whitish or of varying shades of brown or black. The darker shades of fur are often present in the continued fevers. The tongue usually cleans first at the edges, the process gradually advancing toward the centre; a cleaning off in patches is held to be no good indication. We should notice whether it be dry or moist: the dry tongue occurs most frequently in fevers and in mouth-breathers. Any swelling, soreness or ulceration is also to be watched for. In observing the tongue the teeth and gums and the odor of the breath should not be forgotten; if there be any accumulation of sordes about the teeth, or if they be loose, if the gums are sore and tender or bleed easily, a report should be made at once, especially if mercurials are being given.

Special Senses.—*Taste.*—When the tongue is out of order the sense of taste is often impaired or entirely absent. Certain diseases or the administration of certain drugs may give rise to a characteristic taste in the mouth; thus the patient sometimes becomes aware of a

persistent metallic flavor while taking mercurials, iodides, bromides, or arsenic; a bitter taste is complained of in certain disorders of the digestion, and a salty taste in phthisis.

The Ears.—In disease the sense of hearing may be abnormally acute, especially in nervous troubles; some drugs, particularly quinine, may produce temporary deafness. The occurrence of pain in the ear or any discharge from it, with the amount and character of such discharge, should be carefully recorded.

The Eyes.—In observing the eyes we should note the condition of the pupils. They may be dilated or contracted; they may react readily to light or their size may remain unchanged. The eyeball itself may be rolled from side to side or remain motionless. In some diseases we have protrusion of the eyeball; in others it may be sunken. The conjunctival reflex may be active, while in cases of complete unconsciousness it is lost. Certain drugs affect the condition of the pupils, opium causing contraction and belladonna dilatation. Dilatation of the pupils is often present in meningitis.

The *hand* is often an index of the nature of the disease; it may be hot or cold, dry or moist and clammy, steady or tremulous. The power to grasp may be diminished or absent. The character and shape of the fingers and the color of the tips and nails should also be noted.

Any departure from the normal in the condition of the *skin* should be watched for; it may be too dry or too moist. Perspiration may be caused in illness either by weakness or it may accompany a fall of temperature. A high temperature with a damp skin indicates

great weakness and is a grave symptom. Any peculiarity in the odor of the perspiration should be noted. Localized sweating is not uncommon in certain forms of nervous diseases.

In diseases of the respiratory organs the chief points to notice are the cough, expectoration, rate of breathing, pain, and dyspnœa.

Cough is the result of irritation in some part of the respiratory tract, and is often caused by some accumulation or occurs as the result of reflex irritation. The main points to notice about a cough are its frequency and duration, whether it comes on in paroxysms or is short, hacking, and difficult to control; at what times of the day or night it seems to be worst, and whether it is brought on by lying down or moving about; the amount and gross appearances of any accompanying expectoration and the location of any pain associated with the cough should also be noted. Coughs may be described either as sharp and barking, as in some forms of hysteria, or deep and hollow, as in lung diseases; then there is the ringing, brassy cough which accompanies aneurisms of the aorta, and the peculiar laryngeal cough, which is high-pitched and superficial: besides these must be mentioned the characteristic croupy cough in children—a crowing sound produced by the spasmodic contraction of the glottis. The typical convulsive paroxysm of whooping-cough, in which the sound is loud and barking and accompanied by a whoop heard soon after a long inspiration, will hardly be mistaken after the attention has once been called to it. If there is any expectoration, it may be mucoid—that is, clear and tenacious, somewhat like the white of egg; muco-purulent, a combination of mucus and pus;

or completely purulent, as in abscess of the lung. Again, it may be ropy and tenacious, or frothy, and may be streaked with blood. No sputum can be said to be characteristic of phthisis; the nummular or coin-shaped sputum occurs perhaps most commonly in chronic tuberculous disease of the lungs. Now-a-days, by means of special staining methods and microscopical examination, physicians are able in three or four minutes to examine the sputum for tubercle bacilli, and if these are found, there can be no doubt of the existence of a tuberculous process. The bacilli are found in greatest numbers in the minute, whitish, cheesy-like particles, about the size of a pin's head, so often seen in the sputum of phthisical patients. When the lung is gangrenous the sputum consists, as a rule, entirely of greenish pus, and has a very offensive odor. The sputum of pneumonia is often scanty, sometimes very tenacious, and at certain stages is intimately mixed with blood, which gives it a rusty color. The amount of blood may be great, producing the so-called prune-juice expectoration, in the pneumonia of drunkards or where the constitution has been much impaired. Measurements of the quantity should be accurately determined and recorded; and if at any time the nature of the sputum appears to be changed, a specimen should be preserved for the inspection of the physician.

Dyspnœa, palpitation of the heart, variation in the quality and frequency of the pulse, syncope and œdema may all be present as symptoms of disease of the heart; any one of them may occur in connection with other conditions. Palpitation is frequent not only in organic but also in functional diseases of the heart, and in dyspepsia, hysteria and nervous prostration.

Reliable information as to the condition of the appetite and the amount of food taken by a patient can be obtained only from the nurse's observations; the exact amounts taken, whether of solid or liquid foods, should be noted, and also the hours at which they were given. It should be noticed whether the food is eaten with a relish or only with an effort: some patients are inclined to be ravenous, while in others the appetite is capricious, and can be tempted only by particular forms of food. Any inclination to nausea or vomiting should be recorded.

When food is not retained the fact should be recorded and reported, with the amount and character of the *vomitus.* In some instances this may have peculiar characteristics; if so, it should be covered over and saved for the inspection of the physician. The color and odor of the rejected material are of importance, especially where there is any suspicion of intestinal obstruction; for where this is at all serious the contents of the intestine, not being able to pass by it, are forced back into the stomach, producing vomiting of fæcal matter. Small quantities of blood may be changed in the stomach from a red to a dark-brown color by the action of the gastric juice, so that the vomited material has been described as "coffee-ground" vomit. The position and nature of any pain associated with vomiting, and any other symptoms occurring with it, should be inquired into.

Flatulence is the result of fermentation of the contents of the alimentary canal, with the production of gas; if these gases are not liberated in some way they accumulate until there is tympanites or distension of the abdomen; this condition is recognized by the

hard, unyielding, resonant, distended abdomen, and for its relief the passing of a rectal tube is frequently ordered. In a general description of the evacuations from the bowels should be mentioned the color, consistency, whether formed or liquid, the admixture or non-admixture of blood, mucus, or pus, the quantity, odor and frequency. The evacuations characteristic of certain diseases are described elsewhere. The urine should also be kept under daily observation.

The implication of the *nervous system* may be first shown by one or more of many various symptoms. Thus we may have incoherence of speech, rigidity, contortions of the face and body, twitchings, delirium, paralysis or coma. Most of these conditions are treated of in the general description of nervous diseases.

Delirium may be present as a complication in a great many diseases. Its general characteristics—whether it is active or quiet, busy or noisy, muttering or maniacal—should be noted. Delirious patients should be kept under constant surveillance, as they frequently get out of bed, and are liable to do themselves harm. When least expected, a delirium which has previously shown a low quiet muttering form may become loud and noisy or even maniacal. On the other hand, there may be merely a wandering of the mind, without any attempt to move—a symptom which sometimes occurs only during sleep.

Coma is also associated with many diseases, particularly those of the kidneys and heart. It is a state of complete insensibility. In *coma vigil* the patient lies with the eyes wide open, but in a delirious, unconscious state; both are very grave symptoms. In connection

with diseases in women the catamenia should be carefully watched as to regularity, amount, color, and pain.

During the course of an acute illness some other disease may make its appearance. This may be entirely independent of the first—for instance, an epileptic patient may have typhoid or malarial fever—or it may be connected with it. In the latter instance it is properly termed a "complication" of the first affection. In any severe fever certain complications—pneumonia, bronchitis or acute kidney affections are liable to occur. In scarlet fever inflammation of the kidneys must always be watched for.

Even symptoms which may appear trivial should be considered of sufficient importance to report, for when taken in connection with others they may be of great value.

For private duty or for a special patient, in addition to the twenty-four hours' record, a separate book should be kept in which all orders are written down. If such records are preserved by the nurse from the beginning of her nursing work she will in time find them of definite educational value.

In hospitals, regular books for the night reports should be kept. The day report can be given to the physician when he makes his daily visit, but the night nurse should make a brief and accurately written statement of each patient's condition during the night. For patients who are seriously ill a special written record for the twenty-four hours should be kept. The night report should be headed with the date, and each patient's name is to be written on the margin, a space of one or more lines being left between each. No remarks should be allowed in this report beyond a clear

statement of facts founded upon observations such as we have spoken of in this chapter, and at the end should be appended the nurse's signature.

The assistant nurses, appreciating the responsibility which rests upon their head nurse, should do all in their power to assist her by doing their work in the most thorough manner. They should understand that she must look to them for observation of many minor details of what is taking place in the ward. They should therefore be careful to report to her even what might seem to them unimportant symptoms or circumstances. The head nurse should know everything that happens in her ward. The accomplishment of this should not be difficult, as each nurse has special work allotted to her, and her share of the responsibility is strictly defined.

CHAPTER XV.

THE URINE.

The urinary organs consist of the kidneys, the ureters, the bladder, and the urethra. The kidneys secrete the urine; the ureters convey it from the kidneys to the bladder, whence it is expelled through the urethra. Normal urine is a clear, watery, yellowish fluid, with an acid reaction and with a specific gravity of from 1018 to 1020; it is composed of water (in the proportion of 960 parts in 1000), inorganic salts, organic constituents, together with some coloring matter and a small amount of mucus. The more important inorganic salts are chloride of sodium, phosphate of potassium, and the sulphates of calcium and magnesium. The organic constituents are chiefly urea and uric acid. The urine is an excretion; that is to say, it is a fluid which carries off waste particles that would be harmful if left in the system. Two important waste substances of the body are urea and carbonic-acid gas; the former is given off by the kidneys, the latter by the lungs.

In speaking of the physical properties of urine we have to consider the quantity, color, odor, reaction, and specific gravity. The normal amount for an adult for the twenty-four hours is from 40 to 50 ounces or from 1200 to 1500 cc; for children between 2 and 5 years, 15 to 25 ounces; between 5 and 9 years, 25 to 35 ounces. The normal amount in health may be

increased by drinking large quantities of fluids, especially water, by diminished perspiration, and by emotional disturbances. The diseases which may increase the quantity of the urine are diabetes mellitus, diabetes insipidus, hysteria, convulsions, and certain forms of Bright's disease; a temporary increase often marks the crisis in certain diseases—as in pneumonia. As a rule, where the quantity is large the color is pale and the specific gravity low. An exception to this will be found in diabetes mellitus, where the urine is usually clear, the color pale, but the specific gravity high, 1040 and more, although enormous amounts of urine may be passed. Under normal conditions the quantity may be diminished where only small amounts of fluids are taken and where the perspiration is increased. The urine is diminished in amount in fevers, in profuse diarrhœas, in certain forms of Bright's disease, and in puerperal convulsions. The normal odor of urine is aromatic. The normal reaction is acid, but the urine in health may be faintly alkaline at certain times of the day. The first urine passed in the morning generally has an acid reaction, a relatively high specific gravity, and a dark color; after a hearty meal it may be turbid, perhaps alkaline, and of a relatively low specific gravity.

To test the *reaction* litmus-paper is used; acids change the blue color to red, alkalies the red to blue. When urine does not affect litmus-paper, it is said to be neutral. When it changes slightly the color of both the blue and red paper, it is said to be amphoteric in reaction. It is more acid than usual in acute fevers and in rheumatism. Alkaline urine is of two kinds, the first being due to the presence of fixed alkalies,

the second to the presence of ammonia. Alkaline urine is always more or less turbid. If urine is kept in a warm place, it decomposes, with formation of carbonate of ammonia; this decomposition is due to the breaking up of the urea as the result of the action of micro-organisms. These organisms may obtain entrance to the bladder from outside, and a cystitis may be caused, or if already present may be aggravated, by the passage of a catheter if antiseptic precautions are not taken.

Retention signifies the accumulation of urine in the bladder, with inability on the part of the patient to void it. *Anuria or suppression* refers to the failure on the part of the kidneys to secrete urine; in the latter case no urine will be found in the bladder. *Incontinence* of urine means inability to retain it in the bladder.

The *color* of urine may be spoken of as pale, colorless to pale yellow or straw-color, amber, high-colored, reddish-yellow, dark brownish, or blackish. The urine is pale in cases of hysteria, in diabetes, and also in that form of Bright's disease in which it is of low specific gravity; the urine is high colored in febrile and inflammatory complaints, and in some cases of indigestion. Rhubarb gives it a bright yellow or red color, bile imparts a greenish tinge, carbolic acid gives it a dark brown color with the odor of carbolic acid.

By the *specific gravity* of urine we mean its weight as compared with that of an equal amount of distilled water. The normal specific gravity, reckoning that of distilled water to be 1000, is about 1020, but may vary in health from 1015 to 1030. The specific gravity is determined by means of an instrument called a urinometer. Urine should be allowed to cool before

making the test. In health high-colored urine is of high specific gravity, pale urine is of low specific gravity.

In describing urine, the absence or presence of sediment should next be noted; a sediment may have the appearance of a fine powder, or be ropy, viscid, or stringy; we describe a sediment as flocculent when it appears in the form of soft flakes suspended in the specimen. In strictly normal urine no albumin is present. The presence of albumin does not necessarily indicate a disease of the kidneys; thus there will be albuminuria whenever there is blood or pus in the urine —*e. g.* in cystitis or pyelitis.

The pupil should learn how to test for the presence of albumin, sugar, bile, phosphates and urates, and to estimate the amount of the first two and of the urea. This work is best done in the laboratory under a teacher, each member of the class actually making the tests and observing the results.

The principal tests for albumin are—

(1) *The Heat and Nitric-Acid Test.*—Take a convenient quantity of urine in a clean test-tube (where the urine is turbid it should be filtered before testing) and boil it; if there is a large quantity of albumin present, it will be precipitated at once; add two or three drops of nitric acid, and if the precipitate remain the specimen contains albumin. In acid urine the albumin is precipitated below boiling temperature, but in alkaline urine the albumin may be held in solution after boiling, and acid is needed to precipitate it. If alkaline, neutral, or weakly acid urine gives a precipitate on boiling, this may be due to the presence of phos-

phates; if so, these will disappear after the addition of the acid.

(2) The second, and perhaps most common, test of all is the *acetic-acid-and-heat test*. The urine in a test-tube, if not already distinctly acid, is rendered so by the addition of one or two drops of dilute acetic acid. The upper stratum is now heated, and if there is a precipitate, albumin is present.

(3) *Heller's, or the Cold Nitric-acid, Test.*—Take a small quantity of nitric acid in a test-tube, and let the urine trickle, drop by drop from a pipette, down the side of the tube upon it; if albumin is present, a white ring will form at the junction of the acid and urine. Occasionally a specimen rich in urea will show a ring of nitrate of urea, but in that case the white ring begins higher up than the point of junction, and floats off into the urine like a cloud; such urine may be diluted until the specific gravity is 1005, and the test repeated. Further, the nitrate-of-urea ring will dissolve on heating; the albumin ring will remain.

Tests for Sugar (glucose).—

(1) *Trommer's Test.*—To a given quantity of urine add one-third of its quantity of liquor potassæ, and to this, drop by drop, a 10 per cent. solution of cupric sulphate, until a precipitate begins to form; boil the mixture. If sugar is present, red oxide of copper will be precipitated. The test is not reliable for small quantities of sugar.

Fehling's test depends upon somewhat similar principles.

(2) *The Fermentation Test.*—A small piece of ordinary baker's yeast is put into a test-tube full of urine, which is placed month downward in a tray of mer-

cury, care being taken to prevent the urine from escaping by covering the opening with the thumb as the tube is inverted. If sugar be present, fermentation begins, producing, among other things, carbonic-acid gas, which accumulates in the upper part of the tube and gradually displaces the urine. A special apparatus of simple construction—the saccharimeter—is now generally used for this purpose.

(3) *Nylander's Bismuth Test.*—The following solution is prepared: 2 parts of subnitrate of bismuth and 4 parts of Rochelle salts are dissolved in 100 parts of an 8 per cent. solution of caustic soda. Add 1 part of the Nylander's solution to 10 parts of urine, and boil together for a few minutes. If as much as one-tenth of 1 per cent. of sugar be present, the mixture turns black, owing to the formation of an oxide of bismuth. This is a very sharp test, and is probably the safest for general use. It must not be employed, however, when the urine contains albumin, as the latter substance forms a black sulphuret of bismuth.

Quantitative Test.—The amount of sugar in a given specimen may be estimated either by using Fehling's solution or by the saccharimeter, a modification of the polariscope. For the methods, text-books on the subject must be consulted. When the total excretion of sugar or of urea is to be estimated it is necessary to collect and mix together all the urine passed in twenty-four hours.

Sediments.—If normal urine is allowed to stand for a time, a light flocculent sediment, composed of mucus and epithelial cells, becomes visible; this is not abnormal. The so-called brick-dust deposits are made up of urates; these occur in urine which is acid, high-colored,

and usually of a high specific gravity. They are not uncommon even in health, and need not excite any alarm.

The test for *urates* is that they disappear when the urine is heated. They are usually deposited in normal urine which has been allowed to stand in a cold room, and in larger quantities more especially in the urine of fevers and of acute articular rheumatism.

Uric acid occurs in crystals, and forms what is known as a cayenne-pepper deposit. Uric-acid crystals occur only in acid and highly concentrated urine. Sometimes they are passed in fresh urine. These crystals occasionally form the nucleus for a stone in the bladder.

Oxaluria is a term indicating the presence in the urine of a considerable quantity of oxalate-of-lime crystals. They are either envelope-shaped or much more rarely dumbbell-shaped. The crystals of the triple phosphate of ammonium and magnesium are present in alkaline urine, and may form a large precipitate; they disappear upon the addition of acid.

Bile in the urine gives to it a decided color so that when such urine is shaken the froth has a distinct yellowish tinge. A common chemical test for bile-pigment is as follows: A drop of urine is spread out on a white porcelain plate, and a drop of nitric acid (yellow with nitrous acid) is placed beside it. Where the urine and acid meet there will appear a play of colors if bile-pigment is present; the colors produced are green, violet, and red, the first being characteristic. This is known as Gmelin's test, but it is not always satisfactory.

The *sediment* in urine may be organized; thus it

may contain epithelium, pus and blood-cells, tube-casts, accidental deposits, and bacteria. Small amounts of mucus and epithelium may be found in perfectly normal urine; pus in the urine indicates inflammation of some portion of the urinary tract, and always calls for a careful examination. If the inflammation be in the urethra, most of the pus will be in the urine which is passed first, and it will be well to collect the urine in two vessels. A test for pus in the urine is to add liquor potassæ; if pus be present the deposit will be ropy and viscid. In alkaline urine, without the addition of any chemical solution, such a precipitate will probably prove to be pus. Of course a microscopical examination is the best method of deciding as to the nature of all such sediments.

To prepare a specimen of urine for examination, the bottle or glass used must first be sterilized; the urine is drawn directly into it, through a glass catheter if the patient be a woman, and the vessel stoppered with a plug of sterilized cotton or a perfectly clean cork. The vessel should be labelled with the name of the patient, the date and the hour the urine was taken, and the full quantity passed in the twenty-four hours of which it is a specimen; if it is from a ward, the name of the ward should also be added. The fresh specimen should be obtained before breakfast; that taken from the total amount of the twenty-four hours' urine will give more reliable information as to the average specific gravity, and consequently of the total amount of solids which are being excreted. In all cases jars containing the urine should have been thoroughly cleansed, and must always be kept tightly covered.

Inflammation of the pelvis of the kidney is called

pyelitis; it may be caused by calculi, and renal colic may accompany it. No certain diagnosis can be made from the condition of the urine.

Haematuria is a name applied to the condition in which blood appears in the urine; the specimen will appear smoky, and red blood-corpuscles will be found on microscopical examination. The appearance of the urine varies according to the quantity of blood present.

Haemoglobinuria is characterized by the presence of blood-pigment in the urine, derived from the hæmoglobin of the red blood-cells. The blood-cells themselves are either absent or found in insignificant numbers.

Uraemia is a diseased condition caused by retention in the blood of the waste substances which normally should be carried off by the kidneys; the symptoms may be very marked; there may be intense headache, nausea, vomiting, severe twitchings, or even convulsions and coma; but in chronic cases these indications may be so slight that they may perhaps pass unnoticed before an examination of the urine has been made.

For *retention,* before resorting to catheterization, attempts should be made to have the urine normally expelled by means of hot applications over the region of the bladder; in women a hot sponge placed over the vulva will often have the desired effect. Sometimes hot water or ice-water is injected into the rectum, or water is allowed to run down over the pubes; or where retention is due to nervousness the mere sound of running water may succeed in relieving the condition. If the urine is drawn by catheter, the operation should be repeated every six or eight hours according to directions, and the bladder should never be allowed under

any circumstances to go over twelve hours without being emptied.

Incontinence of urine will sometimes be due to overdistention of the bladder, and where this is the case catheterization will be indicated. When rubber urinals are ordered for incontinence, they should be washed out thoroughly at least twice in the twenty-four hours in a solution of hot water, soap, and borax. In fact, if at any time there be the least odor from them, they must be thoroughly scrubbed.

CHAPTER XVI.

Nursing in General Medical Diseases.

While it is quite understood that the diagnosis of disease does not come within the province of the nurse's work, it is nevertheless necessary that she shall know enough about the various symptoms and their import to enable her to make correct reports and do good work, inasmuch as in the course of her work many of her duties call for special knowledge and the exercise of an intelligent judgment. In the present chapter some of the more common non-contagious diseases peculiar to the various systems of the body will be considered with special reference to the duties of the nurse in connection with them.

Tonsilitis.—Besides the common forms of sore throat which we term pharyngitis, and the rarer forms called laryngitis, we frequently meet with an acute or chronic inflammation of the tonsils. Here we find congestion and more or less swelling of the glands and the parts surrounding them. When in the acute form the process goes on to suppuration, the affection is popularly spoken of as quinsy. It begins with a more or less severe chill, accompanying the sore throat, and a temperature of from 102° to 103° F., with headache and backache. A good cathartic and astringent and antiseptic gargles are usually ordered, and when given early enough may cut short the disease. In quinsy, where the pain is severe, applications of hot

water or of ice or poultices will give relief. In children the remedies to the inside of the throat are applied with a camel's-hair brush or swab. The patient should be kept in bed, as the disease rapidly exhausts the strength, and during convalescence a liberal diet should be given.

Acute gastritis denotes a condition often spoken of by a patient as a "bilious attack." In some cases it is caused by overloading the stomach with indigestible food, or comes on after drinking large quantities of alcohol. Furthermore, any irritant poison taken into the stomach may set up an acute gastritis. Vomiting, severe pain and tenderness over the epigastric region are the main symptoms. The patient may be very ill and death sometimes occurs. He should be put to bed, all food should be withheld, and the physician summoned at once. For the pain counter-irritation may be used.

In cases of *gastric ulcer* the nurse should be on the look out for signs of perforation. Sudden severe pain, faintness, a quickened pulse and a sub-normal temperature are all indications that should be reported at once and meanwhile the patient should be kept perfectly quiet, not even being allowed to sit up in bed.

Dyspepsia is a term commonly used to cover a number of so-called functional diseases of the stomach. The patient complains of a sense of oppression and fulness—generally referred to the epigastric region—of pain, dull headache, and languor; he is irritable, and is often very much depressed. The symptoms vary in different persons, and sometimes in the same person at different times; pain may come on immediately after taking food or when the stomach is

empty, in which case it is relieved by eating. Regurgitation or vomiting is a common symptom in cases of acidity caused by fermentation, and flatulence and acid eructations are frequent. Vertigo or dizziness is often caused by indigestion, and constipation is not seldom present. A nurse should report to the physician the appearance of any such symptoms, in order that the necessary restrictions or changes in the diet may be ordered.

Diarrhoea means the frequent discharge of fæces, usually of a soft or fluid character. There are different varieties, the principal forms being the irritative, the symptomatic, the nervous, the chronic, and the choleraic.

Irritative diarrhoea usually lasts but a short time, and is often due to some disturbance in the intestinal digestion from over-indulgence in the matter of food or the eating of tainted meats. The chief symptoms, besides the frequent stools, are more or less severe griping pains, nausea, weakness and, if the disease has lasted long, great prostration.

Symptomatic diarrhoea occurs in the course of certain diseases, such as typhoid fever, dysentery and tuberculous ulceration of the intestines. In the nervous form the intestinal digestion is disturbed by some strong mental emotion, anxiety, or fright. Chronic diarrhœa is often due to frequent or continued indigestion or to chronic inflammation or ulceration of the intestines. A looseness of the bowels preceding an attack of cholera may be mistaken in the beginning for a simple diarrhœa. A very severe form of diarrhœa, resembling true cholera and called cholera nostras, occurs in the summer months, and may follow a sudden

checking of perspiration, the abuse of iced drinks, exposure to sudden changes of temperature, or serious nervous disturbances. The attack usually begins at night with pain in the abdomen, vomiting and purging, and in grave forms there are cramps in the lower extremities and in the abdominal muscles. These symptoms are accompanied by profuse sweating, a weak pulse, and a condition of exhaustion, usually lasting a few hours and terminating rapidly in recovery.

The diet in diarrhœa should be carefully regulated; albumen water, sterilized milk, or milk and lime-water, may be ordered at first, and afterwards the more easily digested solid foods, fruits and vegetables being prohibited entirely even for some days after convalescence. Rest in bed is a valuable adjunct to the treatment. Colonic flushings are sometimes ordered.

The name *appendicitis* is given to an inflammatory condition of the vermiform appendix, which may result in ulceration, perforation, and abscess-formation. The chief symptom is severe pain in the right iliac region, often associated with vomiting and obstinate constipation, localized tenderness on pressure, and elevation of temperature. Perforation with a resulting general peritonitis is an accident to be dreaded. Purgatives should never be given. Until medical aid can be obtained the patient should be kept perfectly quiet in bed, with an ice-bag placed over the seat of pain.

Peritonitis is an inflammation of the peritoneum which may be due to extension of inflammation from any of the organs covered by it or to perforation from an ulcer of the stomach or bowels. It is more especially to be feared after surgical operations on the abdomen if the wound has been allowed to become infected.

The main symptoms are severe pain, the patient lying on the back with the knees drawn up and shoulders hunched up; there is tenderness on pressure over the abdomen, which is generally distended; the respirations are frequent and shallow, the pulse is rapid, small, and wiry; the temperature moderately high; vomiting begins early, the expression changes greatly and the face takes on an anxious and haggard look. The patient should be kept very quiet, and all pressure from the bed-clothes avoided by the use of a cradle. In peritonitis following perforation, immediate surgical interference is usually indicated. If opium is ordered for the pain, the effect should be carefully watched, as unconsciousness may be induced, from which it is hard to arouse the patient. Hot or cold applications to the abdomen are also used to relieve the pain. Crushed ice or soda water may be given for the vomiting. The rectal tube may be passed to relieve the accumulation of gas. To remove fermenting material an enema may be ordered.

By *ascites* is meant a collection of fluid in the peritoneal cavity. The abdomen is sometimes tapped if the amount of fluid be large. When this is to be done the instruments must be sterilized and the abdomen prepared, so that the danger of introducing septic material will be avoided. A small occlusive dressing should be ready for application after the operation.

Bronchitis is an inflammation of the bronchial tubes. It is usually due to sudden changes of temperature, exposure to damp and cold, over-fatigue, over-heated rooms, together with improper food. In the young and in elderly persons it is always to be regarded as a serious affection. The acute form begins as an ordi-

nary cold, which extends to the bronchi, giving rise to a sense of tightness and oppression in the chest. The cough at the onset is dry or is accompanied by but little expectoration, which at first is mucoid in character, but later becomes more copious, and is often purulent; the pulse is quickened and the temperature a little elevated. Immediate care is needed; the patient should be kept in bed in a moderately well-ventilated room, an even temperature being maintained, and a mustard foot-bath and hot drinks may be given. Inhalations of steam and keeping the air of the room moist will relieve the feeling of oppression and the pain. The bowels should be kept open, and plenty of light nourishing food given. Mild cases recover in a few days, but in all the possibility of dangerous complications should be kept in mind and constant watchful care is necessary from the onset until the patient is quite well.

Asthma.—The most common form of asthma is a bronchial affection characterized by cough, dyspnœa, and expectoration of a mucous secretion, the attacks occurring paroxysmally. Although rarely dangerous, it is a very distressing disorder, and in a severe attack the symptoms may be alarming. Asthmatic subjects usually carry remedies with them, such as capsules of nitrite of amyl, which they break in a handkerchief for inhalation; these should never be used except by order of the physician. The patient should have all the fresh air possible, and a hot foot-bath and hot drinks may help to give him relief.

Croupous pneumonia is an infectious disease due to a micro-organism which locally produces an acute inflammation of the lung-substance, and constitutionally

a condition of prostration, resulting from absorption into the blood of the poisons produced by the bacteria. It is a serious condition, and is especially fatal in the case of old people and in individuals who have been accustomed to the excessive use of alcoholic stimulants. It is divided into three stages: the first is the stage of engorgement; the second, that of consolidation; and the third, that of resolution. The lower lobe of the right lung is most frequently attacked: in the so-called double pneumonia both lungs are involved. Anything that tends to depress the vital powers, such as faulty hygienic surroundings, exposure to cold, and particularly to sudden variations in temperature may act as a disposing cause. The onset is sudden: the patient has a chill, complains of a sharp pain in the side, and the temperature rapidly rises. The respirations are quickened to 30 or 40 or more per minute; the breathing is difficult; the face is flushed, particularly the cheeks; with each inspiration the nostrils dilate; the cough is short and hacking; the expectoration at first may be frothy and mixed with mucus, afterward becoming thick, tenacious, and of a rusty-red color, due to its admixture with red blood-corpuscles. In alcoholics so much blood may be mixed with the sputum as to give it a dark reddish-black color; this is the "prune-juice sputum." When resolution takes place, the expectoration becomes light yellow in color and more abundant. Through the course of the disease the temperature ranges from 102° to 104° or 105° F., being a little lower in the morning than in the evening. A sudden fall as early as the third or as late as the twelfth day, accompanied by profuse perspiration, indicates the crisis, after which convalescence

begins. The pulse is full and rapid, varying in frequency from 90 to 120 beats per minute; in severe cases it may even exceed this. Delirium may be present from the beginning, and the patient, who may try to get out of bed, must be carefully watched. For this symptom the ice-bag to the head or the cold pack is often ordered. It is necessary that the nurse make accurate statements to the physician with regard to the pulse, temperature, respiration, and sputum: the last mentioned should be kept for inspection. She must also be able to describe the symptoms, to note any serious change in the condition of her patient, and to understand its significance. The ventilation of the room should be carefully regulated, the temperature being kept at 68° F. The mouth must be especially cared for; when there has been a profuse perspiration the clothes should be changed at once, the body should be sponged in water and alcohol, and warm, dry clothes put on. The diet during the fever should be liquid but concentrated, in order to supply plenty of nourishment. It is best given at frequent intervals: much depends upon the keeping up of the strength of the general system, as heart failure is not uncommon. Some form of alcohol is frequently ordered throughout the course of the disease, when the condition of the heart indicates its use. For the pain the ice-bag, the ice-poultice, or dry heat is applied over the affected side. To reduce high temperature, the cold pack, cold sponging or the tub-bath at 70° F. with friction, is often ordered. When they are employed, care must be taken to keep the hands and feet warm. In the case of a child under three years of age the temperature may be re-

duced by means of the full-bath given in the following way: The child is laid on a sheet which has been spread over the tub and is lowered down, until the sheet forms a sort of hammock which will contain sufficient water to cover the whole body. The duration of the bath should be about eight minutes at a temperature varying according to the height of the fever and the condition of the patient. For older children the compress is preferable, as it saves resistance on the part of the patient. Ice-bags are sometimes applied to the abdomen to reduce the temperature. These procedures not only lessen the fever, but also stimulate the nervous centres and thus improve the respiration and circulation, while at the same time they exert a good effect on the cough and expectoration.

Oxygen is often employed in cases of pneumonia, in poisoning from deleterious gases and other conditions. The gas is contained in a heavy cylinder which can be brought to the bedside. The flow is regulated by means of a stop-cock and the gas is conducted from the cylinder through rubber tubing into a glass flask half filled with water, through which it is allowed to bubble gently and then is directed through another length of tubing towards the patient. If the patient is strong enough he inhales the gas through a glass nozzle placed between his teeth, but for unconscious and very sick individuals a funnel is held over the mouth and nostrils. The effect is carefully watched, the flow of gas being restricted or the funnel removed further away if any distress becomes apparent. Thus far the serum treatment of pneumonia has not proven efficacious.

Pleurisy is an inflammation of the two surfaces of

the serous membrane which surrounds the lungs. It may be localized or general, dry or accompanied with effusion. When the inflammation begins there is a sharp shooting pain, the "stitch in the side," which is aggravated by breathing or in fact by any movement. The pain is caused by the friction or rubbing over each other of the surfaces of the pleura which have been roughened by inflammation. An exudation (the amount and consistence differing in different cases) next takes place. Together with the sharp pain in the side, which is relieved as the exudation increases and forces the inflamed areas apart, the patient may have a slight chill; the respirations are hurried and shallow, the patient fearing to take a deep breath on account of the pain; the temperature is elevated, and there is a short, dry cough, but little if any expectoration. The patient should be kept quiet, being propped in the position that will give the greatest amount of comfort. Where there is much effusion a dry nutritious diet is given, the amount of liquids being restricted. A light bandage applied around the thorax or rubber strapping extending over about two-thirds of its circumference lessens the pain by diminishing the expansion of the chest on the affected side. The straps should be three inches wide and long enough to reach about two-thirds around the chest. They are put on tightly after a full expiration, and follow the direction of the ribs. The lowest strap is applied first and each subsequent one is allowed to overlap the one beneath it by about an inch. An ice-bag may be kept over the seat of pain. As a counter-irritant the Paquelin cautery may be applied or mustard plasters or iodine used. To reduce the amount of effusion the physician orders Epsom salts

or some other hydragogue cathartic. When the cavity becomes much distended with fluid, aspiration is performed. Sometimes the exudation becomes purulent, and the condition is then spoken of as *purulent pleurisy* or *empyema.*

A total loss of power in some of the muscles of the body is called *paralysis;* when the loss is only partial we have what is called a condition of *paresis.*

Hemiplegia means a paralysis by which one whole side of the body is affected. When one limb or one set of muscles only is paralyzed the term *monoplegia* is used. By *paraplegia* we means a loss of power in both arms or both legs. By complete paraplegia is meant paralysis of all four extremities.

These paralyses may be due to various causes—to lesions of the brain, of the spinal cord, or of the peripheral nerves. In most cases hemiplegia is due to thrombosis, embolism, or the rupture of a blood-vessel in one of the hemispheres of the brain.

Where there are muscular spasms or convulsions the nurse should watch carefully to see what part of the body is first affected, since this knowledge may help the physician in localizing the seat of origin of the disease.

With good hygienic surroundings, good nursing, massage, and electricity, complete or partial recovery in some forms of paralysis may take place; great care must be taken to guard against bed-sores.

Tabes, or *locomotor ataxia,* is characterized by a loss of co-ordination in the legs without any marked loss of power in the muscles. It is not a very rare disease. The gait is unsteady, because the patient is not able to tell unconsciously, as he naturally would do, how

his muscles are acting, but has to be guided by his eyesight. As a consequence, walking in the dark is particularly difficult. Attacks of sharp shooting pains, which are termed "lightning pains," often occur in the legs or other parts of the body. Attacks of vomiting and pains in the stomach—the so-called gastric crises—are sometimes met with. By looking after the general comfort of the patient, the nurse can do much toward making his life bearable, and besides this he needs encouragement to make him persevere conscientiously with the treatment prescribed.

Tuberculous meningitis.. The most common form of meningitis with which the nurse will meet is due to tuberculosis and is not rare in children. Meningitis may also occur as a complication of pneumonia and other acute diseases.

Cerebro-spinal Meningitis or *spotted fever* is due to a specific organism, the meningo-coccus intracellularis. The meninges are the membranes which envelop the brain and spinal cord, and meningitis is an inflammation of these membranes. The acute form occurs most often in childhood, but adults are also attacked. There are usually sudden violent headache, severe pain, vomiting, an occasional sharp peculiar cry, great restlessness, and sometimes convulsions. A characteristic rash is often present and herpes is not uncommon. There may be fever, and usually in the beginning there is a chill. In the second stage the pulse is often slow. As these symptoms are aggravated by bright light and loud noises, the nurse should see that her patient is kept quiet, the light subdued, and all visitors kept from the room. Where the house is near a busy and noisy street it may be necessary in

this and other diseases to cover the roadway with sawdust. Noiseless shoes must be worn by all the attendants, and the slamming of doors and other unnecessary noises avoided. The patient should be isolated, an ice-cap or ice compresses should be applied to the head, and the bowels kept well opened. The fever may be reduced by cold spongings. If the vomiting is obstinate, rectal enemata may be needed to keep up the nutrition. The continuous tub-bath has of late been used with good effect. Diphtheria antitoxin has been recommended.

Neuralgia means a sharp pain in the course or distribution of a sensory nerve and is caused by some irritation direct or indirect. Among some of the exciting causes we may mention exposure to damp and cold, chronic poisonings, decayed teeth, dyspepsia, constipation, malaria, or a severe strain of any kind. The pain may assume a variety of forms. One of the nerves most commonly attacked is the trigeminus, or fifth cranial nerve. When the pain in this nerve is associated with sharp spasms the affection is called *tic douloureux*. *Sciatica* may be due either to a neuralgia or to an inflammation in the sciatic nerve. In most forms of neuralgia the diet should be especially nourishing, in order to improve the general condition of the system.

Delirium tremens results from poisoning from the excessive and frequent use of alcoholic stimulants. In the beginning there are depression and anxiety, sleeplessness and muscular tremor, with a weak and feeble pulse. After a few days delusions and hallucinations appear, and in the paroxysms of fear or fury thus induced the patient may become dangerous and attack

his attendants. When he is violent the assistance of male helpers is necessary. Aggravated insomnia is a bad symptom, and if sleep cannot be obtained the termination is usually fatal. The bowels should be carefully regulated. In some cases tub-baths are ordered and forced feeding may become necessary. The patient should be kept in a large room, with the windows and doors guarded and the light subdued.

Cardiac Disease.—Diseases of the heart are diagnosed by physicians chiefly by means of physical signs obtained by inspection, palpation, percussion, and auscultation: with these, of course, the nurse has nothing to do, but she will be interested in noticing some of the general symptoms which occur and which can be remembered only after long observation at the bedside. The most frequent disorders of the heart met with are inflammation, valvular disease, angina pectoris and dilatation.

Heart disease is frequently a sequela to other diseases, such as acute rheumatism, or follows acute infectious diseases as pneumonia, typhoid fever, diphtheria, or Bright's disease.

Pericarditis is an inflammation of the pericardium or the membrane that envelops the heart. *Endocarditis* is an inflammation of the lining of the internal surface of the heart. The origin of both diseases can often be traced to an attack of rheumatism or chorea. Most of the valvular diseases of the heart, where changes in the valves have taken place which cause obstruction to the flow of blood through them, or on account of imperfect closure permit of a backward current, are due to chronic inflammation of the endocardium. Where the valve is thickened and there is obstruction to

the onward flow of blood, we have a stenosis (mitral stenosis, aortic stenosis), and in those cases in which the valves leak, whereas normally they should close tightly, the valve is said to be insufficient (mitral regurgitation or insufficiency, aortic regurgitation or insufficiency). A patient with heart disease may often go on for years without being aware of its existence, though at times he may notice that he is somewhat short of breath. As a rule, it is not until the heart is becoming exhausted that serious symptoms begin to show themselves, although, of course, such a patient sometimes dies suddenly if too much strain is put upon the heart by over-exertion or emotion. The appearance of a patient suffering from a grave heart affection is usually very striking when he comes into the ward. He is often very short of breath; his face may present a bluish appearance (cyanosis); the legs are often much swollen, and the swelling may affect the arms, hands, and other parts of the body (œdema). Besides the proper remedies, he will probably be ordered a liquid or very light diet and absolute rest in bed. If he cannot lie down, a bed-rest must be provided, or he may be propped up with a sufficient number of pillows. In many cases the heart will thus be enabled to recuperate, so that it can do its work fairly well for a long time. All sudden movements and excitement of every kind should be avoided. The patients, especially when they are getting better, are often very much averse to staying in bed, and the nurse will have to exercise a great deal of tact, combined with iron firmness, in order that the treatment may be thoroughly carried out.

Palpitation is a symptom rather than a disease; the

patients complaining of a fluttering or an abnormally rapid beating of the heart, which disturbs them very much. It is often seen in nervous individuals or in those suffering from indigestion or anæmia, and frequently gives rise to unnecessary alarm. It must be remembered that while this symptom may occur in organic disease of the heart, it is by no means a sign of the latter.

Angina pectoris is characterized by a sudden agonizing pain in the region of the heart which extends down the arm and across the sternum. The patient grows pale, utters a cry of pain, and fears that he is going to die; and in fact a fatal termination does sometimes occur. The condition is serious and a physician should be summoned at once.

In all these diseases precautions should be taken to keep the patient perfectly quiet, and to guard against excitement and worry as much as possible. A proper diet is of the first importance.

Oedema or *dropsy* is a condition very common in cardiac and renal disease and in many anæmic states. It is a condition in which the blood serum escapes through the walls of the capillaries into the loose tissues which surround the vessels. Similarly we may have a collection of fluid in any of the cavities of the body such as the pleura or pericardium.

Where fluid is present in the subcutaneous tissues it can be recognized by pressure on the skin, the hole or "pit" made by the finger persisting after the latter is withdrawn. Fluid in the serous cavities of the body can be recognized only by special methods of investigation.

More or less localized œdema may be present in

various conditions as, for instance, as a result of thrombosis or aneurism. In thrombosis the blood stagnates and forms a clot in a vessel whereby the passage of blood is obstructed. In some epidemics of typhoid venous thrombosis is quite common, the vessel obstructed usually being the femoral vein. It is not an uncommon complication in septicæmia and in puerperal infection.

In *myxoedema,* which is due to atrophy of the thyroid gland, the skin of the face becomes pale and swollen, but does not pit on pressure.

In all cases of dropsy the patient should be kept quiet and in bed; flannel must be applied over the swollen parts for warmth. If the œdema is in the lower extremities, they should be carefully bandaged.

Bright's disease of the kidneys, assumes several forms, and may be acute or chronic. The symptoms may be divided into two groups, (*a*) those due to the presence of albumin in the urine (albuminuria), which means the loss of albumin from the blood, (*b*) those attributable to uræmia, a condition due to the presence of poisonous substances circulating in the blood. (*a*) The loss of albuminous substances which should be retained in the body for its nutrition leads to impoverishment of the blood and tissues and gradually to exhaustion of the vital functions. (*b*) In uræmic conditions the patient often complains of a persistent dull, heavy headache, dyspnœa and giddiness. Vomiting and drowsiness are often present. The patient may become delirious or have convulsions and pass into a state of coma during which death often ensues. In acute nephritis there is an inflammation which comes on suddenly and may be the result of exposure to cold or oc-

cur as a complication in some of the infectious fevers, particularly scarlet fever, or after the employment of certain toxic agents, such as cantharides or turpentine. The most prominent symptom is a peculiar paleness of the skin, accompanied by dropsy, the swelling being first noticed about the face, eyes and ankles. There may, however, be a very severe kidney disease without much œdema, though headache, nausea, and other uræmic symptoms will generally be present. The quantity of urine is diminished or there may be total suppression; albumin is always present; the amount of urea excreted is lessened, and casts of the uriniferous tubules are found on microscopical examination. Every effort should be made to keep the skin and bowels active. The patient should be kept in bed between blankets. The diet should be milk diluted with barley-water. Any muscular twitchings should be at once reported since they may be the precursors of uræmic convulsions. The physician may order a sweat bath first and plenty of cream-of-tartar water to drink, which the nurse will make by dissolving a drachm of cream of tartar in a pint of boiling water, and adding the juice of half a lemon and a little sugar; this is to be given cold. Exposure to draughts and sudden changes of temperature should be guarded against.

In the chronic form which may last for many years, the quantity of urine is often increased, the specific gravity is generally low, and in many cases only a trace of albumin is demonstrable.

A record of the amount of urine passed in the twenty-four hours will often be of great assistance to the physician in his treatment of the case in almost any

disease, but where the kidneys are implicated such a daily record should be considered indispensable.

Acute articular rheumatism, or, as it is often called, rheumatic fever, is one of the most painful affections which will come under the care of the nurse. Owing to the complications and the after-effects of an attack of rheumatism, it must always be looked upon as a formidable disease.

The acute form begins with a feeling of *malaise,* often with sore throat, with more or less severe pain in the joints, and with fever, the temperature ranging from 102° to 104° F. The joints become swollen, hot, red, and very painful to the touch or upon the slightest movement; the perspiration is profuse, and has a characteristic sour odor; the urine is strongly acid, highly-colored, and scanty. The bed should be made up with flannel sheets above and below, and the patient should wear a loose flannel gown which opens down the front and has large sleeves, so that it can be changed easily, without giving him unnecessary pain, whenever it becomes damp with sweat. He should have a daily sponge-bath (between blankets) of alcohol and hot water; he may be turned gently from side to side, but should not be moved more than is absolutely necessary. In milder cases the wrapping of the affected joints in absorbent cotton will often be sufficient to render the patient comfortable. Where, however, there is great pain, although hot applications are usually ordered, the patient sometimes prefers ice-cold compresses which are kept constantly saturated with ice-water until the swelling and pain have subsided. Hot compresses saturated with Fuller's solution (carbonate of sodium, 6 drachms; laudanum, 1

ounce; glycerin, 2 ounces; water, 9 ounces) are often very effective. To keep the parts absolutely quiet, splints are sometimes ordered; they should be well padded and applied with moderate firmness. Friction is not well borne until the acute stage has been passed. For high fever the cold bath or the cold pack are sometimes ordered. The diet consists chiefly of milk with alkaline mineral waters. Lemonade, not too sweet, oatmeal-water and barley-water may also be given. Gradually the diet is increased, but for a time should consist mainly of milk and vegetables. Even in convalescence meat should be used very sparingly.

In the chronic forms of rheumatism much relief is afforded by a careful and long-continued massage treatment.

Diabetes mellitus is a disease characterized by the excretion of an enormous amount of urine containing glucose or grape-sugar. The amount of urine in twenty-four hours may measure from six to thirty pints, or even more, according to the severity of the case. The specific gravity is high. There are gradual emaciation and loss of strength, great thirst and a ravenous appetite. Care in the diet and hygienic measures are important factors in the treatment. Dietaries for diabetic patients have been especially prepared, and should be strictly adhered to. Foods containing sugar and starch are not allowed except in very limited quantities. The action of the skin should be especially cared for, and unless the patient be too weak or the œdema be marked, a moderate amount of exercise should be taken daily, or massage may be substituted for it. An equable temperature is to be maintained, and freedom from excitement guarded

against. The signs of improvement are a gain in weight, a moist skin, less thirst, and a diminished quantity of urine containing a smaller quantity of sugar and having a lower specific gravity. The quantity of urine passed, its specific gravity and the amount of sugar present should be recorded daily. The patient should also be weighed once a week.

In *diabetes insipidus* a superabundance of normal urine of low specific gravity is excreted. It occurs most often in young people, and may be congenital. Sometimes such cases may persist for years without any deterioration in health. It is a disease of nervous origin, but its nature is unknown.

Hydrophobia is an acute disease of animals, dependent upon a specific virus and communicated by inoculation, usually by the bite of a mad animal, to man. A variable time elapses between the introduction of the poison and the appearance of the symptoms. The incubation is shorter in children than in adults. Rapidity of onset of the symptoms is determined mainly by the part of the body which may happen to have been bitten. Wounds about the face and head are especially serious. Those on the hands are next in order. Puncture wounds are the most dangerous. Lacerations are fatal in proportion to the extent of the surface afforded for the absorption of the virus. The average incubation period is from six weeks to two months, although it may be longer.

The first symptom may be irritation about the scar, or pain or numbness with depression and melancholia, headache and loss of appetite. Bright light or loud noises are distressing, and difficulty in swallowing is complained of. There may be some increase in the

temperature and pulse rate. In the next stage there are great excitability and restlessness, usually accompanied by violent reflex spasms. Any attempt to take water is followed by a painful spasm of the muscles of the larynx. This is why the patient dreads the sight of water, and this symptom has given the name hydrophobia to the disease.

The bite should be carefully washed and thoroughly cauterized with pure carbolic acid or caustic potash. The wound should be kept open for the first few weeks. In all cases in which it is probable that the dog has had hydrophobia, treatment by Pasteur's method is indicated. If symptoms of the disease appear, the patient should be kept very quiet in a darkened room, and allowed to see only the nurse and physician. Chloroform and morphin are given for the spasms. Sometimes cocain is applied to the throat to reduce the sensitiveness and enable the patient to take liquid nourishment. Nutritive enemata are usually ordered.

The *examination of the blood* plays an important part in the diagnosis of disease. The outer surface of the lobe of the ear is usually selected for making the puncture, and is thoroughly cleansed with soap and water, and then with sterile water. From the needle puncture a drop of blood is obtained which is placed on a coverslip, and examined by the aid of the microscope.

In the various forms of *anaemia,* the blood drop shows definite changes which can be recognized by the expert. The so-called primary anæmias are due to disorders of the bloodmaking organs; the secondary anæmias are usually associated with some other acute or chronic disease. In anæmia there is usually pallor

of the face, gums, and conjunctivæ, with a gradual loss of strength. The symptoms will depend upon the particular disease which has produced the anæmia. Proper food, with pure air (either in the mountains or at the seaside) together with careful nursing and some preparation of iron or arsenic by the mouth is the usual treatment that is prescribed. In "pernicious anæmia" the ultimate outlook is bad. In this form the stomach, intestines and spinal cord are often affected. Extreme prostration results and finally causes death.

CHAPTER XVII.

MEDICAL EMERGENCIES.—ARTIFICIAL RESPIRATION.—DROWNING. —POISONS.—MEDICAL APPLIANCES.—MEDICAL ROUNDS.

Under the head of *medical emergencies* may be classed conditions of unconsciousness, such as syncope, hysterical, epileptic, and apoplectic attacks, acute alcoholism, sun-stroke, drowning, and poisoning.

Syncope, or unconsciousness, is often seen, in a mild form, in what is commonly called a "fainting fit." The condition is generally due to some disturbance in the circulation, and often follows a transient anæmia of the brain. It is apt to come on suddenly, and is not a serious condition unless the attacks are often repeated, in which case one would suspect the existence of some disease of the heart or blood-vessels. The patient should be put in the recumbent position, with the head lower than the rest of the body, so that the blood may flow more quickly to the brain: this, in addition to loosening the clothes about the neck and upper part of the body and allowing the free access of pure air, is usually sufficient. The respiratory movements may be stimulated to action by holding for a few seconds aqua ammonia or some smelling salts near the nose, although here we must warn against the danger of holding strong ammonia too close to the nostrils of an unconscious patient. If recovery does not take place almost immediately, external warmth should be applied and medical aid sent for.

Care should be taken not to confuse fainting with that form of hysteria in which the patient lies apparently unconscious: the latter may be recognized in that the pulse-rate will be normal, and if an attempt is made to raise the eyelid the patient will resist and close it again; the body will feel warm, and there will be little if any change in the color of the face. For hysterical patients it is best to remain near them while the attack lasts, but to leave them undisturbed until they recover.

Epilepsy should properly be discussed under nervous diseases, as it is due to a disordered condition of the brain. Since, however, epileptic convulsions are of very frequent occurrence, and may come on at any time or place, the nurse may be almost certain of somewhere being confronted with an attack, and it is very necessary for her to know what to do and what not to do for the sufferer. The "fit," as it is commonly termed, is characterized by well-defined symptoms: the patient, sometimes after uttering a peculiar cry, but often without giving the slightest indication to the bystanders that anything is wrong, suddenly falls to the ground, where he lies unconscious. The muscles become rigid (tonic spasm), the eyes are fixed, and the pupils often dilated. In some, but not in all, cases there is frothing at the mouth. After a few seconds the muscles become relaxed, and the tonic spasm is followed by twitchings and jerkings of the whole body (clonic spasm). The attack lasts only three or four minutes, after which the patient either becomes completely conscious and may go about his business at once, or on coming to is very irritable or seems drowsy and goes off into a deep sleep. The only relief that an

on-looker can give is to place the patient on his back with the head slightly raised, loosen any tight clothes, and see that he does not hurt himself: he should be allowed a free supply of air, and something should be placed between the teeth to keep him from biting his tongue. A lead pencil or a piece of wood wrapped in a handkerchief can always be obtained, and will serve every purpose. No attempt should be made to stop the movements.

The so-called *apoplectic* fit is usually caused by hæmorrhage into the brain substance. A person suddenly, or after some slight premonition, falls and becomes unconscious; the face takes on a deep purplish flush or grayish-pale color, the pulse is full and slow, and the breathing stertorous. The pupils may be dilated and unequal. The patient should be put in a semi-recumbent position, all tight clothing should be loosened, especially about the neck, and cold applications should be made to the head, while dry heat in some form is applied to the trunk or extremities. Stimulants must not be given, and the room should be kept cool, dark, and quiet.

Owing to the flushed face and unconscious condition which occur in both, apoplexy and the stupor of *alcoholic intoxication* may easily be confounded. In intoxication, however, the alcoholic odor of the breath may be a guide, but it must be remembered that some form of alcohol is often forced upon any sick man by a kindly but injudicious bystander. The pupils are more often dilated evenly, and the patient can often be partially aroused from the condition of stupor, although he may sink again into it at once. In acute alcoholism an emetic may be given, and after he has

vomited freely the patient may be turned on his side and left to sleep off the effects. A nurse must never take the responsibility of these cases upon herself, as a condition of coma not unfrequently simulates so closely that of alcoholism that even physicians of wide experience may be unable to decide at first as to the correct diagnosis. This is more particularly true in cases in which no history of the onset of the attack is obtainable. Many cases, which have been classified as instances of sudden death from heart disease or apoplexy, have now been shown to be due to disease of the coronary arteries of the heart.

Coma means a condition of profound insensibility, during which the functions of the brain are in abeyance. It may be due to various local causes, such as compression upon or hæmorrhage of the brain, or to the circulation of poisonous substances in the brain as in uræmia. Thus we may have a uræmic, a diabetic, a post-epileptic, an alcoholic and a narcotic coma.

Sunstroke, or insolation, as the name indicates, sometimes results from prolonged exposure to the sun's rays, but *heat-stroke* more often comes on not from any direct exposure, but from staying too long in a continuously high temperature. There are two forms —one in which the temperature is high, and the other in which it is subnormal. Cases in which there is no elevation of temperature are classified under the head of "heat exhaustion."

In sunstroke, or thermic fever, the patient has an extremely high temperature, from 106° to 110° F. or even higher. He is unconscious, the face is deeply flushed, and the breathing deep and labored. The first thing is to reduce the excessive tempera-

ture, which should be done in hospitals by immersing the patient at once in a cold tub-bath at from 60° to 70° F., to be continued for fifteen to twenty minutes, while iced compresses are applied to the head. If the temperature continues high after the patient has been removed from the tub ice packs may be employed, but the continuous tub with ice is better. Or he may be stretched on a bed covered with a long rubber sheet and freely sponged with ice-water and rubbed over with ice. If in a tent, the patient may be placed on the ground and water from a hose or pails poured over him, care being always taken to make sure that the head is kept cool and wet. In addition to the above treatment a method recently adopted is the subcutaneous or intravenous injection of normal salt solution, about 1000 cc. to 1500 cc. being injected at one time at a temperature of 97° F.

In *heat exhaustion* the symptoms may be quite the opposite, and resemble those seen in a condition of shock; the temperature is subnormal, the pulse small and rapid, the extremities are cold, and consciousness may be entirely lost. Stimulants are given until the pulse improves, the patient being kept quiet and in a dark room.

Artificial respiration is resorted to when a patient has ceased to breathe, and the employment of mechanical means promises a restoration of the act of respiration. In asphyxia from chloroform, in narcotic poisonings and suffocation from gases, with the newborn infant, and in cases of drowning, it is often necessary.

Sylvester's method is considered the best. The patient is placed on his back with a pad just under the

shoulders to assist in the expansion of the chest-walls; the tongue must be caught with forceps and drawn out, the forceps being left on to prevent it from slipping back; or after being drawn out it may be held in place by a dry handkerchief or strip of cloth tied to it, the ends of which are crossed at the back of the neck, brought around and fastened under the chin. The operator stands or kneels at the head and, grasping the forearms at a point about halfway between the elbow and the wrist, carries the arms steadily over the patient's head until the hands touch behind. By these means the chest-cavity is expanded. After being held there for two seconds, until sufficient air has entered the lungs, the arms are carried back and pressed against the sides of the chest in order to expel the air; after an interval of a few seconds the process is repeated. This is continued, the movements being made steadily and slowly at the rate of sixteen to the minute, corresponding to the number of normal respirations. Much perseverance is necessary, as we may often have to work for two hours or more before any signs of life or breathing become visible. It is to be remembered that there is always a tendency to perform the movements too rapidly.

Marshall Hall's method is to roll the patient over on his face and make gentle pressure on the back in order to expel the air from the lungs. In order that it may enter them, the patient is rolled over on his side. These movements are repeated at the same rate as in Sylvester's method.

To restore a person who is apparently drowned, one must lose no time, but begin at once by removing the clothes as far as the waist. The mouth is pressed

open, wiped out, and the back of the throat cleared of any mucus that may have collected there. The patient is next turned with his face downward, the abdomen being allowed to rest on a folded coat or shawl or over the knee of the operator, and pressure is made on both sides of the thorax, so that any water which may have entered the air-passages may be forced out. When this has been accomplished, the patient is again turned on his back and artificial respiration is started. In the meantime some one should have been sent for stimulants and blankets. Hot and cold water alternately dashed on the chest may assist in exciting the respiratory movements. As soon as possible the patient should be enveloped in blankets and surrounded with hot cans, and even after he has begun to breathe fairly well he must still be watched until there is no further danger of cessation of the respiration.

Poisons, as the term is popularly understood, are substances which when taken into the body even in small quantities endanger or terminate life. They may be taken accidentally or with suicidal intent, and it is usually under such circumstances that a nurse is called upon to act with promptness in order to counteract or check the action of the poison. If a poison has been administered by accident in the presence of a nurse, she should relieve her patient, as far as possible, from anxiety or nervous shock by making any necessary statement as little alarming as possible, and by taking prompt steps to remedy the evil. A physician should at once be sent for, and in the mean time, according to the nature of the poison, remedies may be administered which act either by removing the substance or by preventing or counteracting the action of the poison.

Such remedies are termed antidotes. An antidote may act in one of three ways: *mechanically*, by preventing absorption or by emptying the stomach; *chemically*, where one substance, combining with another, produces a comparatively harmless third substance; or *physiologically*, where the substance administered counteracts the effects of the poison upon the system. When one has to act upon general principles without knowing what the poison is, an emetic is perhaps the best thing to give first. One that can nearly always be obtained in a moment is mustard and warm water. For an adult half an ounce, and for a child two drachms, of mustard to a cup of water may be given, and the draught repeated every ten or fifteen minutes until free vomiting is produced. Salt and warm water may be used in the same way, or vomiting may be produced reflexly by tickling the pharynx with the index finger or a feather.

The other common emetics ordered are—sulphate of zinc (10 to 20 grains) in a cup of water repeated every fifteen minutes; powdered ipecacuanha (15 to 30 grs.) or fl. ext. ipecac (15 to 30 mins.), or syrup of ipecac (a teaspoonful).

The washing out of the stomach is generally the quickest and best thing to do if the mucous membranes have not been too much injured by the action of the poison.

Poisons may be divided, according to their action, into corrosives, irritants, narcotics, and narcotico-irritants.

A *corrosive* poison is one that is likely to eat or burn through organic tissue instantly, while an irritant poison is one which acts more slowly upon the tissues,

producing inflammation which may result later in suppuration and perforation.

For these violent poisons the antidote should be one which will act chemically upon the poison, either rendering it harmless or at least reducing the intensity of its action. An emetic is, as a rule, not indicated, the action of sulphuric acid, for instance, being usually so rapid that the tissues would be injured long before an emetic could be given, so that the latter would only add to the irritation. The stomach-pump should not be used, as its introduction may assist in the destruction of the mucous membrane and produce perforation. Demulcent drinks (mucilage) may be given, and if possible some chemical antidote.

In the after-care of patients suffering from poisoning from irritants, great care should be taken with regard to the diet; only the soft, non-irritating foods should be given, such as finely-strained gruels, milk-porridge, egg albumen, etc.

In narcotic or narcotico-irritant poisoning the action is systemic, and the antidote may be a combination of all three forms.

Below we have tabulated some of the more important poisons, together with the treatment to be followed when they have been taken into the stomach:

Corrosive Poisons:		*Immediate Treatment.*
The Acids .	Acetic. Citric. Hydrochloric. Nitric. Oxalic. Sulphuric.	**Give magnesia mixed with milk or water, chalk-powder, or an alkali, such as soda, diluted, followed by white of eggs and mucilaginous drinks.**
	Carbolic acid.	**Whiskey or some other form of alcohol, Epsom or Glauber's salts. Emetics, milk or lime-water. No oil, as it aids absorption.**

The Alkalies	Ammonia. Caustic potash or soda. Potassium nitrate (saltpetre). Calcium (lime).	For any alkali give a mild acid, such as vinegar or lemon-juice, 1% carbolic acid in water or sour cider. With fixed oils, such as sweet oil or castor oil, the alkalies form emulsions. Bland drinks, albumen, etc.
Irritants:		
Antimony .	Tartar emetic. Wine of antimony. Syrup of squills.	Produce emesis. Give as antidote tannic acid or very strong tea. Follow with demulcent drinks.
Arsenic . .	Fowler's solution. Paris green. Rough on Rats. Arsenious acid.	Give an emetic of mustard and water. The antidote is the hydrated sesquioxide of iron, made freshly by adding a sufficient quantity of aqua ammonia or of a solution of carbonate of soda to the tincture of iron to form a heavy red precipitate. Strain and wash the precipitate and stir it in milk or water, and give freely and frequently.
Mercury (hydrargyrum)	Bichloride of mercury (corrosive sublimate). Calomel. Blue mass.	Albumen (white of egg) is a chemical antidote, one egg to 4 gr. of the mercury. Milk may also be given and then flour paste. Vomiting is to be induced after the antidote has been given.
Iodine . . .	Tincture of iodine.	Starch or flour, mixed into a paste with water, should be given, followed later by an emetic.
Iron	Tincture. Syrup of the iodide. Monsel's solution of the subsulphate.	Antidote, magnesia. Plenty of water to drink. Produce emesis.
Lead	Acetate of lead (sugar of lead).	Antidote, sulphate of soda or of magnesium (Epsom salts), or white of egg or milk. Use emetics or stomach-pump.
Phosphorus	Matches. Phosphide of zinc. Pill. Various kinds of hypophosphites.	Wash out the stomach in recent cases. As an emetic, sulphate of copper answers well. Oil must never be given, as it dissolves phosphorus and hastens its absorption.
Gases . . .	Carbonic oxide gas (illuminating gas) Chlorine.	Fresh air. Artificial respiration. Stimulants.

Narcotics and Narcotico-irritants:

Aconite	Fluid extract. Tincture.	Emetics or stomach-pump, external and internal stimulation; atropin or digitalis.
Alcohol	Brandy. Whiskey. Wines, etc.	Stomach-tube, cold applications to head, heat to extremities, inhalation of ammonia (cautiously).
Belladonna	Tincture. Fluid extract. Atropine (alkaloid).	Emetics or stomach-tube, tannic acid, and morphin. Artificial respiration, heat. Rectal injections of strong coffee.
Digitalis	Tincture. Fluid extract.	Emetics, tannic acid in large quantities. Hot external applications.
Chloral	Chloral hydrate. Croton chloral.	Wash out the stomach with tea or coffee. Alcoholic stimulants. Strychnin. Artificial respiration. External heat, mustard plasters, mustard foot-bath, etc.
Hyoscyamus	Tincture. Extract. Sulphate of hyoscyamine.	Same treatment as for belladonna-poisoning. Fresh air. Cold-water affusions.
Chloroform	. . . .	Artificial respiration. Stimulants. Strychnin hypodermically. Counter-irritants.
Nicotine	Alkaloid of tobacco.	Prompt emetics. Tannic acid. Artificial respiration.
Nux vomica	Tincture. Fluid extract. Strychnin.	Emetics. Wash out the stomach. Tannic acid or tincture of iodine. Morphin or chloral for the convulsions.
Opium	Laudanum. Paregoric. McMunn's elixir. Morphin (alkaloid).	Emetics, such as sulphate of zinc or mustard. Wash out the stomach frequently with water or a weak solution of potassium permanganate. Cold-water affusions. Strong black coffee by mouth and rectum. Artificial respiration. Keep the patient awake.

Poisoning may also follow the use of certain kinds of mushrooms, tainted meats, fish, cheese, milk, and ice-cream. In such cases prompt emetics, followed by purgatives and stimulation, internally and externally, should be employed.

Except in the case of mushrooms the poisonous properties of these substances are often the result of bacterial growth.

For medical nursing but few appliances are needed in proportion to those required in surgery; still, there are certain things which are necessary and which should be kept on hand ready for use.

The same conveniences for applying heat externally, such as hot cans and bags, with their canton-flannel covers, are required. Pneumonia cotton-jackets, lamb's wool, flannels with oiled-silk covers for stupes, should be kept made up, since they may be needed at any moment.

An *auscultation towel* should be a yard square, and made of cambric or Victoria lawn or of some other thin white material; it is used by the physician during the examination of the heart or lungs when he wishes to listen with his ear directly against the patient's body. It should be thrown by the nurse over the patient's face and chest. When laundered no starch is used, as it must be soft and noiseless.

Cupping-glasses, an aspirator, one or more stomach-tubes, and catheters should be included among the permanent ward supplies.

The *aspirator* is an instrument used to withdraw serous or other fluids from the pleural or abdominal cavity; by means of it suction is possible without the introduction of air.

In preparing for aspiration the needle should be sterilized in the same way as that of a hypodermic syringe, and the part of the body where the needle is to be introduced washed off first with soap and water, then with bichloride solution, and afterwards with alcohol. Besides these, there must be a basin of carbolic-acid solution, towels and sponges, a hypodermic syringe, a solution of cocaine, stimulants, and, if the

amount to be drawn off is very large, an extra receiving vessel should be ready. A small dressing of absorbent cotton and celloidin or strapping will be necessary for application after the operation.

If a patient is to be tapped for ascites, a rubber sheet and an abdominal bandage will also be needed.

For *venesection* the same antiseptic precautions are taken as for aspiration, and in addition to the things mentioned above, artery forceps, dressing forceps, a scalpel, scissors, needles, and ligatures (all sterilized) must be ready. The dressings necessary for a minor operation will also be required.

In some diseases *lavage* of the stomach is ordered: a long rubber stomach-tube is used and the stomach is washed out with lukewarm sterilized water or a warm boric-acid solution. For this procedure there should be in readiness a rubber sheet, soft bath towels, a good-sized basin, a gallon of sterilized water at about 100° F., and a two-quart pitcher. The patient may sit in a chair or, if in bed, he may be supported by a head rest. The head should be inclined slightly but not too far backward. The tube is inserted as far as the back of the pharynx, and, the patient being told to swallow, is passed down the œsophagus, its extremity having been previously dipped in water or oil. The mouth of the tube is slightly elevated and half a pint of the irrigating fluid is poured gently in through a funnel. The outer end of the tube is to be lowered before all the fluid has run into the stomach, and in this way the gastric contents may be siphoned off into a basin. The process is repeated until the washings become clear. After the stomach has been thoroughly cleansed, nourish-

ing food is sometimes introduced through the stomach-tube. This latter procedure is known as *gavage.*

On medical morning rounds the head nurse should always have with her the book containing the night report, an auscultation towel, a tongue-depressor, a measuring-tape and a thermometer. She should anticipate as far as possible anything that may be asked for and be prepared to answer questions regarding any of the patients under her charge.

CHAPTER XVIII.

Surgical Nursing.—Aseptic and Antiseptic Surgery.—The Healing of Wounds.—Inflammation.—Complications.—Surgical Dressings.—Preparation of Patients for Operations (Capital and Minor).—Care of Patients After Operation.—Nursing in Surgical Diseases.

In order that a nurse may appreciate the technique of modern surgery and the importance of carrying it out in its minutest details, she must try to understand the underlying principles which have been established by scientific research in the field of bacteriology.

It has already been stated that decomposition or putrefactive changes cannot occur in the albuminoid tissues of the human body without the presence of some form of microscopic life, and that the organisms that produce such changes in the tissues are of different varieties, the most important being cocci and bacilli. The *micrococcus* is a spherical, the *bacillus* a rod-like, organism, and there are many varieties of each, which can be distinguished by differences in shape, motility, growth on culture media, and the pathogenic effects resulting from their introduction into animals. In abscesses the organism most frequently found is a coccus, groups of which are seen arranged in the form of little grape-like bunches, and which produce a bright-yellow color when grown on the surface of a boiled potato. Hence it has been named the staphylococcus pyogenes aureus (golden pus-producing coccus in grape-like clusters).

For acute septicæmias, which cause death in a few days, usually without pus-formation, a coccus is also often responsible, but this kind, instead of growing in grape-like clusters, generally forms chains, and has been named Streptococcus pyogenes (pus-producing chain coccus).

Wound-infection cannot occur without the presence of some organism, and wounds, whether operative or accidental, afford favorable conditions for the reception and development of germs, for in them micro-organism find nourishment, moisture, and a suitable temperature, the three essentials necessary for their growth. The ways by which they may enter are numerous. Into an accidental wound, germs may be introduced by the instrument causing it, by the clothing, or by dirt which has been allowed to enter before the surgeon sees the case. In operation cases, if infection takes place, the organisms have been introduced into the wound by the surgeon, by his assistant, or by the nurse through some fault in technique; thus the instruments, dressings or hands may not have been completely sterile. There is one exception, however, to this rule, since it is impossible to thoroughly disinfect the skin, and wound-infection may arise from organisms which have their habitat there.

Although, as has been proven, chemical agents are capable of causing pus-formation, yet, clinically, they never do so. Chemical antiseptics, however, if used in strong solution, are very irritating, and may injure or destroy the tissues, lessening their normal resistance, and forming a favorable medium for the growth of germs. Wounds that have become the seat of bacterial growth are called *infected wounds,* and are

in a condition of sepsis, poisons being produced which are carried into the circulation by the lymphatics and blood-vessels, causing an inflammation in the wound and septic fever—a condition usually indicated first by a rise of temperature and an increased pulse-rate. Occasionally not only the poison enters, but germs themselves get into the blood-current; then we have to do with a general *blood-infection,* and not simply with a localized wound-invasion with secondary *blood-intoxication.*

Modern surgery aims at the prevention of wound-infection by bacteria, and attempts the destruction or inhibition of the growth of germs already present. Two expressions commonly used with reference to the treatment of wounds are *asepsis* and *antisepsis.* By an aseptic wound we mean a clean wound, free from germs, while antisepsis refers to the measures employed to destroy organisms which may be present either in the wound or on the skin, hands, and instruments, all of which must be sterilized and made free from germs before coming in contact with any, but more especially with a clean wound. Hence the most minute precautions must necessarily be taken by both surgeons and nurses in preparing themselves or anything that will come in contact with a wound during an operation, or at subsequent dressings.

The term "clean" and "surgically clean" have then, two widely different meanings, since "surgical cleanliness" should signify a complete absence of germs. To secure this aseptic condition, both chemical and natural agents are depended upon, and with the patient the first steps are taken some hours previous to the operation by rendering the skin of the body over and around

the seat of the operation as clean as possible. Practically, "surgical cleanliness" of the skin in the strictest sense of the term, is at present impossible, for in spite of all known methods of disinfection, in the glands of the skin certain bacterial forms are constantly present.

But the healing of wounds depends first upon the kind of wound, and secondly upon its aseptic condition. A wound may be defined as a solution of continuity of the soft parts. Wounds are classified as—

Incised, such as are made with a sharp instrument;

Contused, such as are made with a blunt instrument;

Lacerated, when the tissues are torn and ragged;

Punctured, when made by a pointed instrument—*e. g.* stab wounds.

Wounds are also spoken of as infected or non-infected, according as they do or do not contain pathogenic or disease-producing organisms in sufficient numbers to disturb the process of healing.

With a wound there may be pain, gaping of the edges, and bleeding. Pain varies in different people and in different parts of the body.

A lacerated wound beneath the skin, where the surface of the latter is not broken, is called a contusion or bruise. Contusions are caused by direct violence. The symptoms are discoloration or ecchymosis, indicating an extravasation of blood. In a contusion or bruise the object in treatment is to prevent further effusion of the blood, to control the pain and inflammation, to preserve the vitality of the tissues and to promote absorption. Heat applied at some distance from the bruise relaxes the surrounding vessels and promotes absorption. Cold has the opposite effect; it contracts the blood-vessels and prevents absorption.

Until recently it was thought that the healing process in an incised wound differed from the repair that went on where a cavity had to be filled up by means of granulations, and the healing of a clean incised wound was called *healing by first intention,* or *primary union;* where the process was brought about by the filling up of a cavity, this was called *healing by second intention,* or *secondary union;* and when two granulating surfaces came together, the wound was classified under those which healed by third intention. It is now taught that the process of repair that goes on in wounds under any circumstances is precisely the same, the only difference being that in an incised wound, little injury having been done, only slight reparative processes are necessary, while, where there are large cavities which must be filled up by granulation-tissue, much more extensive regenerative changes are needed.

The healing of wounds should therefore be divided into only two divisions—*aseptic wounds,* in which the healing is not retarded by bacterial poison and growth, and *infected wounds,* where there is delayed healing owing to the action of bacteria. In wounds that heal by first intention, as in a clean incised wound, no granulations are visible. The two edges are kept in close apposition, the blood and lymph on the cut surfaces join them together, the healing process takes place rapidly, and there is very little opportunity for the entrance of germs.

Wounds which heal by granulation, or by second intention, are much more difficult to keep quite free from infection, although every care should be taken to do so. Healthy granulations are small red eleva-

tions which spring from the fixed cells of the connective tissue. They gradually fill up a wound, starting from the sides and the bottom. Granulations may grow too rapidly and increase beyond the desired point, in which case they must be reduced and kept in check by the application of some astringent: nitrate of silver, either in pencil form or in solution, is the one most frequently used. On the other hand, the granulations may be pale and flabby and need stimulating: balsam of Peru is then most often applied. Where there are very large granulating surfaces, as after large burns, *skin-grafting* is resorted to to hasten the healing. The entire surface is covered with thin layers of skin as large as can conveniently be shaved from some other portion of the patient's body, the leg, thigh, or arm being generally chosen. To prepare skin for grafting purposes, the same antiseptic precautions must be rigidly carried out as in preparing a patient for operation. When all is ready the skin is shaved off with a large-sized knife with a very keen edge; the graft is at once transferred to the wound, and spread over it, unless it has become doubled up, when it is first floated out in normal salt solution. Strips of rubber tissue should be laid in salt solution in readiness to cover the wound before applying the pads of gauze. The tissue prevents any disturbance of the newly-formed skin surface, and the granulations are not torn when the dressing is removed.

A cavity formed by the removal of a quantity of tissue may be allowed to fill with blood, which forms a clot, and this blood-clot gradually becomes organized, the fibrin forming a delicate scaffolding upon which new blood-vessels and granulations find support. This

method of filling up cavities and dead spaces is sometimes made use of by surgeons.

Where granulating wounds have a tendency to heal over from the top they may be kept open by means of drains or gauze packing. Sterilized rubber tubing of various sizes and strips of plain or iodoformized gauze, bismuth gauze or rubber tissue, are kept for this purpose. The plain or bismuth gauze is considered more suitable for most granulating cavities.

Inflammation is sometimes found in connection with wounds, and is a condition of great importance. All diseases the names of which terminate in "itis" are inflammatory in character. Inflammation comprises those changes in the tissues which result from the action of certain irritants. The causes are —

1. Mechanical—blows from different sources;
2. Chemical—various corrosive poisons;
3. Physical—heat, cold, or electricity;
4. Infectious inflammation (caused by micro-organisms).

The phenomena of inflammation are dilatation of the blood-vessels, an increased flow of blood to the part, the appearance in the tissues of leucocytes or white blood-corpuscles and of red blood-cells which have passed through the walls of the vessels, and the exudation of blood-plasma.

An inflammation is said to be fibrinous, serous, or purulent according to the nature of the exudate. The symptoms are heat, redness, swelling, pain, tenderness and disturbance of function of the inflamed part.

The object in treatment is to remove the cause, or, if this cannot be done, to protect the tissues as far as possible from further irritation. If the inflammation

subsides, resolution has taken place, but if the inflammation continues, the termination is usually in abscess, suppuration or gangrene. Inflammation in connection with wounds is most often due to infection, and if it results in suppuration, the abscess should be opened up freely and allowed to drain thoroughly. With the various kinds of wounds—the results of accident or operation—a nurse will become familiar during the course of her training in the surgical wards and operating-rooms, but to become familiarized with minor wounds and their treatment, the surgical dispensary training is the most desirable and should precede the ward and operating-room experience. In addition, it is most important that a nurse should be informed of the various complications that may develop in connection with wounds and after operations. These are various forms of blood-poisoning, septicæmia, pyæmia, sapræmia, erysipelas and tetanus.

Erysipelas is an acute highly infectious disease, the result of the invasion of a virulent micro-organism (*Streptococcus*). It usually appears in from three to seven days after exposure, and is ushered in by a chill and elevation of temperature. If it be a wound that has become infected—and the majority of the cases of erysipelas arise in this way—a characteristic bright-red flush appears about it. If there is no perceptible abrasion the flush first appears on the nose and cheeks. The face becomes badly swollen, the skin smooth and tense, and small blisters may appear. A lint mask may be applied to the face, and kept moist with a disinfectant. The patient should be isolated at once and the usual precautions taken.

The terms *septicaemia, pyaemia,* and *sapraemia* have

come to have an altogether different significance since our knowledge of the infectious processes has become extended. In both septicæmia and pyæmia there is a general blood-infection with pus-producing bacteria, resulting usually from the infection of an open wound, accidental or operative. In an *acute septicaemia* the cocci multiply rapidly in the blood, and are very virulent, causing death sometimes in twenty-four or forty-eight hours through a direct poisonous effect upon the whole system. The symptoms are, as a rule, a sudden chill, accompanied by considerable elevation of temperature, a rapid compressible pulse, and vomiting.

In *pyaemia,* on the other hand, either the bacteria are less virulent or the patient's tissues are more resistant, and the disease, lasting longer than acute septicæmia, results in the formation of multiple abscesses all over the body, particularly in the joints and larger organs. The fever runs the so-called "choppy" course which is seen on the charts of pus cases of all kinds, the temperature being perhaps normal in the morning, and going up to 103° or 104° F. at night. There will be chills, followed by profuse sweating; the patient becomes rapidly emaciated, and develops a hectic flush on his cheeks; the pulse becomes small and very frequent, and finally death occurs from exhaustion. There is no sharp dividing-line between septicæmia and pyæmia, and cases apparently halfway between the two conditions just described have been called cases of septicopyæmia.

Sapraemia is an entirely different process. Here the pus-formation is altogether local, and the bacteria do not get into the blood and go all over the body. Severe symptoms, and even death, may nevertheless

occur from absorption of the toxic chemical products from the local abscess or slough.

Tetanus, popularly known as lockjaw, and formerly supposed to be purely nervous in its origin, has been proven to be caused by a peculiar kind of bacillus. This species is found most often in garden earth, manure, or putrefying fluids, the poison being conveyed by the earth or dirt that is carried into a wound either at the time of its occurrence, or afterward where it has not been properly protected. The affection begins with stiffness in the neck, and a tightness about the jaws which increases until finally there is a tonic contraction of the muscles of mastication, which is called *lockjaw*: the stiffness extends gradually over the body. These spasms are severe and painful; the patient lies perfectly stiff and rigid, or may be drawn up so that he rests upon his head and his heels. The greatest quiet should be observed, as noise or irritation may excite more convulsions; the room should be darkened and no one allowed to enter but the physician and nurse. These cases are usually fatal. If nourishment cannot be taken by the mouth, an attempt should be made to give it by means of a tube, through the mouth or nose or by rectum.

The tetanus antitoxin. The results obtained from administration of this substance in the disease itself have not been up to the present time very encouraging. Nevertheless, its use as a prophylactic is indicated from the fact that it has often been injected into horses occupying infected stables and has apparently stopped the spread of the disease.

For the regular surgical dressings (or, in hospital parlance for "surgical rounds") one nurse should be

especially appointed, for a certain length of time, to make the necessary preparations, and before the hour for rounds the head nurse should see for herself that nothing has been forgotten. There should never be anything wanting in the form of a dressing or appliance that may be asked for by the surgeon; any omission shows either lack of management or carelessness.

Dressing-carriages or trays should be made with regard to cleanliness as well as to convenience. The kind that fulfills these requirements is made almost entirely of glass with a light iron frame. If dressings are made from bed to bed, a portable washstand is also convenient, as the surgeons wash their hands before each dressing. The articles that should always be ready for surgical rounds in a ward are—

The dressing-carriage, fully equipped with solutions, bandages, and other appliances.

A portable washstand, with plenty of hot and cold water, soap, and brushes for scrubbing the hands.

White-rubber sheets, from six to twelve in number.

A covered granite-iron pail for soiled dressings.

One dozen granite-iron basins.

Irrigation-bags.

Sterilized dressings and instruments.

Besides the head nurse there should be two assistant nurses, one to go ahead and prepare the next patient, the second stationed near and ready to wait upon the head nurse, whose duty it is to see that the bed and patient are prepared for the dressing and that the surgeon is promptly supplied with whatever he requires. It does not do for a nurse to wait to be told what the surgeon will use next; she must train her-

self to anticipate his wants and have everything in readiness. Everything should be done not in a hurried or excited manner, but coolly and collectedly. Talking at rounds should be limited to necessary questions and answers, and a quiet dignity observed in accordance with the seriousness of the work engaged in. To do good work a nurse should give it her undivided attention, and laughing or chatting before a patient, who perhaps is in pain, is quite out of place.

Where practicable it is better to do all dressings in a room of medium size adjoining the ward, since the appliances can be kept more easily in a compact and surgically clean condition than when they must be carried about. Moreover, much time is saved, other patients will not be disturbed by the sufferings of the one who is being dressed, and the ward can be kept free from the contamination of soiled dressings and from much disorder. Patients can be transferred from their beds to a wheeled stretcher and rolled into the dressing-room, or else, if the bed is on casters, it may be wheeled to the dressing-room door, and the patient lifted directly from his bed to the dressing-table.

Preliminary preparation of a patient. Before carrying out any operative procedures which are not urgent it is advisable that some days or even weeks should be devoted to the building up of the general strength, or in other words to the increasing of the patient's chances of recovery by adding to her powers of resistance. Such a period requires the most cheerful surroundings possible; a light wholesome diet; plenty of water to drink, an abundance of fresh air and sunshine with massage and rest in bed. A bright, kind, and thoughtful nurse can do much towards improving the patient's

condition. The patient should not be allowed to be disturbed by seeing many visitors. During this time a specimen of the urine should be sent to the laboratory daily for an examination.

The immediate preparation of a patient should be begun from fifteen to eighteen hours before the time appointed for the operation. A general bath should first be given with hot water and soap. Next, not only the part where the incision is to be made is shaved, but also a large area around it, which perhaps will be touched by the operator's hand. The skin should be left smooth and quite free from hairs, and then scrubbed with green soap (a soft potash soap very strong); a green-soap dressing should then be applied and left on for an hour and a quarter. In rectal cases if the tissues are broken down the green soap is omitted; the raw area is covered with rubber tissue and sealed over. The preparation of the surrounding parts can then be proceeded with. If the surface be thick and hard, like that over the patella, it should again be well scrubbed and the green soap reapplied for another hour, after which it is to be sponged off with 1:3000 bichloride solution and enveloped in a sterilized dressing securely put on. This may be saturated with a 1:3000 bichloride solution or a 1:80 carbolic-acid solution, about three hours before the operation. This form of preparation within the past year has been done away with by some surgeons who require no preparation of the patient until placed on the operating table, but until this method has been generally adopted the above procedure must be understood by the nurse. A purgative should be given for two successive nights before the day of the operation

or frequently enough to have the intestinal tract well emptied and not distended by flatus. To ensure a thorough evacuation a simple enema is given in the morning. Three hours before the operation is performed the enema should be entirely expelled, particularly in plastic operations on the perinæum, and unless a stimulant or a cup of hot beef-tea is ordered early in the morning, nothing should be given by mouth after midnight. The urine should be either voided or drawn off by catheter just before the patient is sent to the operating-room. For vaginal operations a douche should also be given; the patient should be attired in a fresh short night-gown, stockings, warm wrapper and flannel combinations. If the nature of the operation will permit, a flannel undervest should always be worn or a loose flannel jacket. A woman's hair should always be well brushed and braided; all jewelry, and any artificial teeth should be removed. The same preparations apply for a minor operation if there is time, but the purgative may be omitted unless an anæsthetic is to be given. It is undoubtedly pleasanter for the patient if the anæsthetic can be administered while she is in bed. Generally, however, this is impossible, and she is conveyed to a room especially set aside for the giving of the anæsthetic. The room is generally close to the operating room, as the operator can in this way be near by in case any difficulty arises as a consequence of the anæsthetic. In a hospital the patient's chart and history are sent to the operating room with her. It is necessary to do many minor operations at very short notice, and in these cases the preparation should consist in scrubbing the surface with green soap and hot permanganate-of-potash and

oxolic-acid solutions; finally, it is sponged with ether and alcohol and covered with a dressing saturated in bichloride solution (1:1000,) and the patient is ready for the operation.

In general surgery the *after-care* of the patient after the first twenty-four hours is, as a rule, very simple, unless complications arise, and good nursing will do much toward a rapid restoration to health. The preparation of the bed for such patients has been mentioned before. Immediately after the operation is over, the patient is placed in bed and a nurse detailed to remain beside her until the effects of the anæsthetic have worn away. If there be much nausea, water should be given sparingly at first, as it only aggravates the trouble: sips of hot soda-water are better. A condition bordering on collapse or a complete prostration of the vital forces may follow a severe operation, the pulse being very small and feeble, the face and lips pale, and the body covered with a cold perspiration. Such a patient should be wrapped in warm blankets, with plenty of hot-water bags about her, the body rubbed with alcohol, and a stimulant, either strychnin, atropin, morphin, whiskey or brandy, must be at hand ready to be given if ordered. After major operations hæmorrhage should be watched for during the first twenty-four or forty-eight hours; indeed, the possibility of such an occurrence should be borne in mind until the wounds have healed perfectly, as secondary hæmorrhage may occur several days after the operation. Perfect quiet should be maintained, as any undue noise adds to any nervousness that may be present. As soon as she becomes conscious and the effects of the anæsthetic are wearing off, everything possible

should be done to add to the patient's comfort. An ice-bag may be ordered to be applied to the head. Frequent gentle sponging of the face, hands and extremities with cool water and alcohol are sometimes very soothing. Rubbing the back and limbs with alcohol and placing pads under the back and knees will ease the patient; she should be well bathed night and morning and watched carefully in order that bed-sores may be prevented. The nourishment ordered at first is usually in the form of fluids or a light diet—milk, eggs, and broths—but, as a rule, full diet is allowed very soon after the operation. The pulse and temperature are to be recorded twice daily, unless the symptoms require that this should be done more frequently. As soon as ever her condition justifies us in doing so, the patient should be lifted out of bed into an invalid chair, or carried out of doors into the fresh air and sunshine, as it is important in every way to keep up the general good condition of the system while the process of repair or healing is taking place. Unless a serious rise of temperature necessitates an early change, a first dressing is usually kept on for a week or ten days, or even for a fortnight, according to the nature of the operation.

After a surgical operation of any kind the chief complications that may occur are shock, hæmorrhage, sepsis, obstruction of the bowels and suppression of the urine. The symptoms to be looked for are an elevation of the temperature, a quickened pulse-rate; distention and pain in the abdomen; an anxious expression of the countenance; nausea and frequent vomiting and inability to expel flatus. If vomiting is present it is better to discontinue all feeding by the

mouth until it ceases. For distention a rectal tube is sometimes inserted for 5 or 10 minutes at a time. The bowels are generally ordered to be opened on the day after the operation. The character of the pulse and temperature will give the best indication as to the patient's condition.

The following are some of the more common surgical diseases that require careful nursing.

Ulcers or open sores occur internally and externally; they are of many kinds, arise from different causes and present various appearances. As a nurse is sometimes detailed to dress an ulcer she should be familiar with the various changes it may undergo in order that she may know whether it is healing over or not.

In a healthy condition the granulations are of a bright red color and the surrounding skin has a slightly bluish tinge. If the ulcer is not doing well the edges look inflamed, a foul discharge is secreted; the granulations are swollen and sometimes a slough is present.

An abscess is an accumulation of pus in any part of the body. External abscesses are often left to rupture spontaneously, but in many instances, especially when the contents would escape into the peritoneal cavity, operative interference is the only safe procedure.

Haemorrhoids, or *piles,* are due to a dilated condition of the veins of the lower part of the rectum. They are frequently met with in patients suffering from constipation, which causes undue pressure upon the hæmorrhoidal veins. When inflamed they are very painful, and may give rise to tenesmus. In the milder cases palliative, local treatment is often efficacious, but when the condition is sufficiently aggravated to render

the patient's life a burden removal by surgical procedures becomes necessary. To prepare a patient for such an operation laxatives are ordered for two days, and on the morning of the operation the field of operation is cleaned in the usual manner, a T bandage being employed to hold the dressing in place. After the operation every effort must be made to keep the parts free from infection. A solution of bichloride of mercury or carbolic acid should never be applied to a hæmorrhoidal surface, as severe poisoning from absorption has often been met with.

By *tracheotomy* we understand an operation in which the trachea is opened and a tube is inserted in order that the patient may be enabled to breathe. It is usually an emergency operation, especially in cases of œdema of the glottis or tumors of the larynx, when the mucous membrane becomes so swollen by the effusion that the patient is in danger of dying from closure of the air passages. The same danger is present in diphtheria when the membrane has extended into the larynx and trachea. Tracheotomy is also employed at times in other operations on the throat, the anæsthetic being inhaled through gauze placed in a funnel attached to the tube. The apparatus consists of a tube within a tube made of silver. The outer tube is held securely in place by means of two pieces of tape which are passed through the holes in the tube and then tied together round the neck. The inner fits into the outer tube and projects for a short distance beyond the external end. The after care consists in the management of the tube, feeding and good general nursing. Vigilant attention to the condition of the inner tube is necessary, as the mucus and membranous de-

posit are likely to fill it up and thus cut off the air supply. At first the tube may have to be taken out about every twenty minutes, or more frequently if there are signs of obstruction of the lumen. After being removed it is dropped into a basin containing a warm saturated solution of boric acid and thoroughly cleaned with a small brush; after which it is replaced. In milder cases, however, the mucus can be cleaned out, while the tube is in position, with an ordinary wing feather, which, of course, must have been previously sterilized. Care should be taken that the cleansing process is not overdone. The surgeon usually removes and cleanses the outer tube every 24 hours. The temperature of the room should be kept at 70° F. The air breathed by the patient should be kept moist, the steam from a kettle of boiling water being allowed to come in contact with the tube. Good ventilation is necessary, but the patient should be well protected from draughts. Nourishment should be given regularly. At first, especially in the case of a child, it may be necessary to give liquids through a tube, passed down the throat through the nostril, since the patient will often refuse to take them by mouth, on account of the great pain associated with swallowing. In cases of diphtheria the nurse must be careful to keep her face away from the tube as much as possible when giving it the necessary attention.

Intubation has largely superseded tracheotomy for all cases of acute laryngeal obstruction, especially in cases of diphtheria. Much practice is required to perform it properly. One of the main points is that the patient should be held in a proper position, and in this respect the nurse can render the operator efficient

service. A sheet is wrapped round the child's body in such a way as to render the arms immovable. The nurse then takes the patient on her knee, holding its back firmly pressed against her own body. The head is held slightly inclined backward, both for intubation and extubation. Casselbury's method of feeding intubated patients is as follows: Lay the child upon its back across the nurse's lap. Extend its head backwards and downwards and feed from a spoon or nursing-bottle. In the act of swallowing, fluid may be forced into the tube, gravity will then carry it out again away from the larynx—the child being still able to swallow—upward. Semi-solids can sometimes be taken more readily than fluids.

A *fistula* may be defined as a suppurating tube-like passage in the body. Thus by a vesico-vaginal fistula we mean an artificial opening connecting the bladder and the vagina. In these cases some of the urine escapes from the bladder into the vagina. A *rectal fistula* frequently follows an abscess which has formed in the rectum near the anus. It may communicate with the vagina (in which case we have a recto-vaginal fistula) or with the skin surface. *A blind fistula* has an opening at only one end. In dealing with this last the tract may be opened up freely and the cavity packed with gauze, the wound being then allowed to heal up by granulation. Another method consists in dissecting out the walls of the fistulous tract and bringing the raw edges together by means of stitches.

A *hernia* is a tumor formed by the protrusion of the contents of a cavity through its wall. Thus we may have a protrusion of a portion of the bowel, or omentum, through the inguinal or femoral ring or through

an opening at the umbilicus—the varieties of herniæ being respectively inguinal, femoral, and umbilical. In most cases an inguinal hernia is reducible,—that is the bowel can be returned to the abdominal cavity by manipulation, after which it can often be prevented from coming out by means of a truss. Sometimes the mere act of lying down will allow the hernia to return to the abdominal cavity. An umbilical hernia is not uncommon in women, after child-birth, and in infants. For the former, unless it is very pronounced, usually nothing is done as it gradually disappears of itself, as soon as the abdominal walls regain their normal firmness. A firm pad and binder are sometimes used to keep the protrusion back until the opening becomes smaller.

When the protruding mass, owing to a constriction at the opening, cannot be returned to the abdominal cavity we have what is known as a strangulated or incarcerated hernia. This is generally a very dangerous condition, for unless relief is soon secured obstruction of the bowel and gangrene may occur. The symptoms of strangulation are (1) a tumor in the neighborhood of the ring, which, however, is sometimes so small as to be scarcely noticeable, (2) intense pain over the region (3) continuous vomiting with retching, (4) constipation with flatus in the bowel which can not be expelled. When such a condition is met with until a physician takes charge of the case no food and not even water should be allowed, although for the relief of the thirst and nausea the mouth may be rinsed out with hot water. An enema should not be given. The patient should be kept in the recumbent position and with the hips elevated.

An ice-bag over the swelling may relax the constriction sufficiently to allow the return of the hernia. No force is used and if gentle manipulations fail to bring about a reduction an anæsthetic is given and the necessary operation is performed. Operations for hernia are usually curative, especially when no incarceration exists. A hernia of moderate size can generally be kept up by wearing a well-fitting truss, but there is always more or less danger of incarceration.

Intussusception is due to the slipping of a part of the small bowel into the portion below it. It occurs generally in children. It usually produces symptoms of obstruction—severe pain, vomiting, tenderness and distention of the abdomen. In well-marked cases a tumor mass can be felt and blood is passed from the bowel. No food is to be given. Local applications of ice or warm stupes are made over the abdomen. An enema may be given by the surgeon or the bowel may be distended with air. If these means are not successful an operation is the final resort. The condition is serious and needs the attention of a skilful physician.

Biliary and urinary calculi. If a stone is trying to escape from the kidney into the ureter or from the ureter into the bladder through the ureter, it produces as a rule an attack of renal colic. When a stone is in the gall-bladder and an operation becomes necessary, the gall-bladder is opened and the stone having been removed, drainage is carried out. The cutting operation for the removal of a stone from the urinary bladder is called *lithotomy*. When the stone is crushed, the procedure is called *lithotrity*. The patient should

be kept dry and warm, and the back should be carefully protected against the formation of bed-sores. A rubber pad to protect the bed is always needed in these cases.

After the *amputation* of a leg or arm the stump should be elevated on a pillow protected by a rubber slip. The nurse should always be on the look-out for hæmorrhage from the stump, which would first be shown on the dressings, and later by constitutional symptoms of shock. The bed-clothes should be prevented from coming in contact with the injured part by means of a "cradle." The dressings are generally removed in about ten days.

Orthopaedic surgery is carried out for the correction of deformities in children and somewhat less often in adults. Practical demonstrations of the special forms of apparatus that are necessary for such cases should form part of a nurse's training. Experience in the nursing of such patients can seldom be acquired in a general hospital, and any nurse who is especially interested in the subject should take a practical course in an institution which pays especial attention to this class of patients.

CHAPTER XIX.

BANDAGES.— SURGICAL EMERGENCIES.— SHOCK.— FRACTURES.— SURGICAL APPLIANCES.—DISLOCATIONS.—SPRAINS.—CONTUSIONS.— BURNS AND SCALDS.— FROST-BITE.— FOREIGN BODIES IN THE EYES, NOSE, EARS, AND LARYNX.

The principles of bandaging, the variety of bandages and the indications for applying any particular form may be taught theoretically, but only by long practice can one become an expert in bandaging. A beginner must not set out with the idea that the first essential in applying a bandage is to have it look well. The chief points to be taken into consideration in bandaging are—

1. The object of the bandage.
2. The kind of bandage and the material of which it is made.
3. The part of the body to which it is to be applied.
4. The best method of applying it.

Bandages are used in surgery to keep dressings and applications in place, to make compression, to prevent motion, and to act as a support and protection. They are made of different materials according to the use to which they are put. For hospitals, the substances chiefly in use are surgical gauze, bleached or unbleached muslin, flannel and rubber. For private practice it is sometimes more convenient to use old linen or muslin. These bandages vary greatly in the matter of pliability: unbleached muslin, for instance,

is not so adjustable and does not lie so snugly as gauze or flannel, and therefore more skill is required to apply a muslin bandage, so that it will stay in place, and while being comfortable will also look well, than when gauze is employed. When we have a bandage to put on, we must always take into consideration the part of the body to be covered. This is important, not only because it will influence us in our choice of the bandage, but because we must always have some idea of the degree of pressure that will be comfortable, since some parts are more elastic than others. Any excessive tightness should be avoided, though allowance must be made for some loosening of the bandage later, caused by the moving about of the patient. The maintenance of an even pressure, sufficient firmness, and comfort should always be kept in mind. We shall stand convicted of a disregard of this rule if when a bandage is removed from an arm, for instance, the skin shows little ridges separated by distances which just correspond to the width of the bandage; for the presence of these proves that the compression has not been made evenly, and that the bandage has been in some places perhaps uncomfortably tight and in others too loose.

Bandages are classified as simple and compound, the former being made of one, the latter of two or more pieces. The roller bandage is made in six, eight and twelve-yard lengths and of various widths. As gauze stretches more and is less bulky, bandages of this material should be made both wider and longer than the muslin bandages used for the same purpose.

The average widths of muslin bandages are about as follows:

For a finger, 1 inch;
For the arm or head, 2½ inches;
For the leg, 3 to 4 inches.
For the body, 6 to 8 inches.

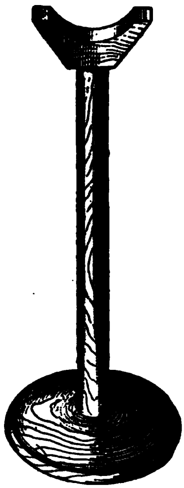
Gauze bandages for the head, arm, or leg are made 3½ inches wide;
For the fingers, 1½ inches;
For the body or for large dressings, 6, 8, or 9 inches.

For muslin bandages strips of the proper widths are torn and, the ravellings from the sides having been removed, are wound tightly and evenly by hand or on a bandage roller. The end of a piece of muslin with the stamp of the maker in blue letters should never be used, unless it has been first washed, and a bandage should not be handed to the surgeon with ravellings of thread hanging from it. Some gauzes can be torn when wet, and rolled after they have been allowed to dry, but, as a rule, gauze bandages have to be cut. Usually a thread is drawn out as a guide to follow in cutting out each bandage, which is then rolled by itself; but where very many are used this procedure takes too long, and, although bandages made in this way do not look quite so neat, a broad piece of gauze may be rolled on a large roller and then cut with a sharp knife into the requisite widths. The wider bandages, such as the 7-inch and 8-inch widths, plaster-of-Paris bandages and others which must be wetted, can very conveniently be rolled on small round hard-wood sticks about three-eighths of an inch in diameter: this arrangement prevents them from doubling up and makes them more easy to apply.

Flannel bandages when used to reduce swelling or œdema are best cut on the bias, as made in this way

they are more elastic and it is possible to make firmer pressure. The rubber bandage is used to control hæmorrhage, for varicose veins, or for reducing swelling. For holding dressings or applications in place on a limb the simple roller is used, and should be put on firmly enough to prevent the dressing from slipping: the tension should be uniform throughout the course of

Fig. 7.



Heel-rest.

the bandage. The spiral and *figure-of-8* are the forms used for bandaging the limbs. The bandage should always be put on from the extremity of the limb toward the trunk. It should be held firmly in one hand, and applied with the outer surface next to the skin, and as it is unwound the roller should be held close to the part. The bandaging of the leg of a patient who is sitting is much facilitated by the employment of a heel-rest (Fig. 7).

The single and double recurrent bandage (or capeline) and the *figure-of-8* are used for the head. The Barton bandage is employed to keep the jaw in place. A recurrent bandage is also the one generally used for the stump after an amputation. For the axilla, shoulder, or groin the spica (either double or single) is used. For a fractured clavicle the Velpeau or Desaults bandage is employed. The *figure-of-8* is particularly adapted for application to the breasts; for the abdomen some modified form of the Scultetus bandage is largely used. The T-bandage keeps dressings in place on the perineum. Bandages intended to prevent all motion are usually made of plaster of Paris, starch, or crinoline, and of these the plaster-of-Paris bandage is most frequently used. To make plaster-of-Paris bandages it is necessary to have the plaster of an extra fine quality, without any lumps in it, and to select either crinoline or gauze, since the meshes of these substances are large, retain the plaster well, and such bandages are readily moistened. The dry plaster is spread evenly on the gauze with a knife and smoothed over it by means of a tightly-rolled flannel bandage, and as the plaster is rubbed in, the bandage is rolled loosely on a small round stick. When finished these bandages are wrapped in paper, and kept in a tin box away from the air and moisture, though at best they are apt to deteriorate soon. They are much used in fracture cases. When they are to be applied, the limb is first bathed and powdered, then wrapped in folds of gauze, or better still, covered with rolls of sheet cotton of a sufficient thickness to protect the skin from the plaster. Instead of gauze or sheet cotton cut into strips, a flannel bandage is sometimes used, but it is liable to be unpleas-

antly warm and may cause irritation. A basin of warm water, a can of plaster, salt, and large rubber sheets to protect the bed and floor, are required. The plaster bandages are put into the water and allowed to remain till the little bubbles of air cease to rise. This is a sign that they are thoroughly soaked, and they should now be wrung out moderately tightly. For the foot and leg the surgeons usually begin by putting on two 4-inch bandages, and then for the thicker parts of the leg and thigh two 6 inches and one 7 inches wide. After the bandages have been applied a handful or more of plaster is stirred into the basin of water until the consistency is that of thick cream, and the mixture is rubbed smoothly over the whole dressing. The addition of salt to the water—about two drachms to the quart—will materially hasten the hardening of the plaster; but this is not always used, for frequently the difficulty is to keep the plaster from hardening too rapidly. Melted paraffin painted over the exposed portions is sometimes used to protect the dressing from the moist wound secretions. When it is necessary to remove a plaster bandage it should be cut off with a stout sharp knife or scissors. This process will be found less difficult if the line of incision be moistened from time to time with dilute hydrochloric acid or hydrogen peroxide from a medicine-dropper.

Crinoline bandages are used to keep dressings immovable: they should be rolled on sticks, wetted in warm water, and not too tightly wrung out, just before being used. To make them even stiffer, starch is sometimes incorporated into the crinoline. The starch should be boiled as for laundry use, the crinoline bandage dipped into it, wrung out, and applied. If necess-

ary more starch can be rubbed in. The bandage should be exposed to the air until dry: hot cans placed about it will hasten the process.

In addition to the spiral and *figure-of-8* bandages and various modifications, we must speak of the triangular bandage, which is rarely employed in hospital practice except as a sling, but is very serviceable in surgical emergencies, as it can be more readily improvised than any other kind. Two opposite corners of a large square of strong muslin measuring a yard or 40 inches each way are brought together, and the square is cut into two equal triangular pieces. These bandages are used for the same purposes as the roller bandage—namely, to keep dressings in place, to fix splints, and for protection and support. A large uncut handkerchief can be made to answer as well. The various methods of applying the triangular bandage are fully demonstrated in the ordinary books on bandaging.

Where small dressings are to be put on or applications are to be held in place, and a bandage would be too large or cumbersome, strips of rubber adhesive plaster are used. Splints on arms or legs are sometimes held in place by this means, and in cases of fractured ribs, where the movements of the injured side are to be restricted, instead of a bandage, straps of rubber plaster are applied halfway round the chest. The rubber adhesive plaster is very convenient, as it is always ready, and needs no special preparation beyond being torn into the required widths and lengths and then rolled on glass rods. When rubber plaster is to be removed, it should be well moistened with alcohol, or ether, which loosens it somewhat and renders the

process less painful. Any remains of the rubber adhering to the skin can be easily washed off with alcohol or ether.

For practising bandaging the best opportunities are afforded by minor surgical cases in dispensary work, to which the nurses are usually detailed in turns as assistants. In connection with this, a good book on bandaging, in which the various steps are all carefully demonstrated, should be obtained, and the methods studied out and practised on fellow-nurses and patients until the requisite skill is acquired; but it must be remembered that it is not so necessary to keep to a prescribed figure as to have the bandage put on smoothly, firmly, evenly and comfortably.

Surgical emergencies. Next to that of the physician, the presence of a trained nurse should be most valuable at the time of an emergency. While others are standing shocked and helpless, her presence of mind will not desert her; she will at once suggest the right thing to do, and will proceed to do it in a cool and collected manner. The example she sets, in keeping her own nerves well under control, will go far toward steadying those about her and making them of some help to her. An emergency may be of greater or less importance; if it be only a minor accident, a nurse may be able to do all that is necessary for the time being, but in any case, unless the injury is clearly trivial, medical aid should be summoned at once, and if possible this should be done in writing, so that the surgeon may know what to expect and may be enabled to save time by bringing with him whatever is necessary. So much will depend upon the nature of the emergency that only general rules can be given, and a nurse

must be guided by these, together with the results of her own experience. If a hæmorrhage should be the worst symptom of an injury, it should be controlled at once before anything else is done, and if the patient is in a condition of shock, steps should be taken to revive him.

By *shock* is meant a general depression of the whole system produced in some obscure way which is at present imperfectly understood. This condition occurs after severe frights, accidents, and operations, or may be brought about by some strong emotion. *Collapse* and *prostration* are used to express similar conditions. Symptoms of shock should always be watched for after slight as well as after grave injuries. It is always the safest plan to keep a patient quiet for a time after any kind of injury, and the pulse should be taken at intervals, because sometimes changes in it may be recognized when no other symptoms are apparent. The symptoms to be looked for in shock are a weak, rapid pulse, a subnormal temperature, a cold skin, pallor, a pinched look of the face and about the lips, feeble or sighing respiration, and sometimes nausea. The patient must be placed with his head low, and stimulated by being enveloped in blankets, while hot-water bags, bottles, or cans are placed along his sides, between the legs, and to his feet, the effects of these being supplemented by friction and by the use of whiskey or brandy internally. If the patient is unconscious, the alcohol may be given hypodermically. When stimulants can be administered by the mouth, a teaspoonful may be given in half an ounce of hot water every ten or fifteen minutes. Strong hot tea or coffee are also valuable. An electric battery should

be ready for use, as a surgeon sometimes asks for it; and ether and a solution of strychnin may also be required. The latter drug is often used in various forms of shock, particularly after operations. It is usually ordered to be given hypodermically in doses of from one-sixtieth to one-twentieth of a grain. An enema of hot normal salt solution is often ordered.

If the injury be to the head, alcoholic stimulants are generally contraindicated, and should never be given without a special order.

Fractures.—Fractures are very frequent emergencies, but when unaccompanied by a wound they do not, as a rule, require the same degree of haste as cases of hæmorrhage. The first thing to be done is to place the injured part in as comfortable a position as possible for the time being; then the clothing is gently removed, the seams being ripped rather than cut, beginning with the uninjured side first. A fractured limb must be handled as little as possible, as there is always danger of injuring the surrounding tissues or of lacerating blood-vessels with the sharp points or fragments of the broken ends. In raising a fractured limb one should never take hold of it from above, but should slip the hands underneath, and, taking firm but gentle hold at two points a short distance from the fracture on each side, and all the while making slight extension with the hand on the distal side, so as to keep the ends from rubbing together, should lift with both hands at the same time slowly and evenly until the limb is in the position required.

Fractures may be recognized by the following signs, some of which, however, belong also to dislocations:

1. Pain;
2. Inability of the patient to move the limb naturally;
3. Deformity or displacement, either seen or felt by passing the fingers over the seat of pain;
4. Crepitus, the grating sensation felt on rubbing the broken ends together;
5. Abnormal mobility in the course of a bone;
6. Swelling and discoloration;
7. In hospitals the Roentgen Rays are often used to determine whether a fracture or dislocation is present.

Fractures are classified according to the nature and extent of the break and of the accompanying injuries. A fracture is said to be *simple* or *complete* where the entire continuity of the bone is severed with but little injury to the surrounding parts; it is called a *compound* fracture if not only the bone is broken, but a wound is made which extends from the seat of the fracture to the outside. Such wounds may be caused by the injury itself or may occur secondarily from the protrusion of pieces of bone through the skin.

A *comminuted* fracture is one in which the bone is shattered into a number of fragments. The term *impacted fracture* signifies that the broken ends have been forcibly driven into one another, and are thus fixed.

Fractures may be *multiple*—*i. e.* where the bone is fractured at two or more different points or where more than one bone is broken.

A *complicated* fracture is one associated with a serious injury to some important adjacent part—*e. g.* a large vessel.

A *green-stick* or *incomplete* fracture occurs where

the bone is soft and bends, and is only partially fractured; it is relatively frequent in children.

Fractures are also described as *transverse, oblique,* or *longitudinal* according to the direction of the break.

The process of repair of fractured bones, while not coming directly into a nurse's work, is one of very great interest. At the time of the fracture and for a little while after, much blood is poured out in close proximity to the injury; this subsequently coagulates, and forms a framework upon which new tissue-cells grow and divide. New blood-vessels enter, lime salts are deposited, and in a few days the so-called callus is formed. The less the ends of the bones are disturbed, the less will be the amount of callus. This first callus has for its chief function the keeping of the ends of the bones at perfect rest until they become firmly united. The union of bone requires from four to six weeks, and then the provisional callus becomes in part absorbed. Still, the injured part is somewhat weak, and is not to be depended upon too much, and care should be exercised for another month, while for the process to be thoroughly complete from six months to a year are needed.

In considering the treatment of fractures, we shall first speak of the care of the patient when he has to be moved some distance before the injury can be attended to properly. The principal point to bear in mind is to keep the fractured part immovable, and in such a position that it may give as little pain to the patient as possible; if this be done, there need be no hurry about having the fracture set at once. The limb should be supported with something stiff and smooth, such as thin, narrow pieces of board or shingles, stout paste-

board, or the bark of trees, padded with something soft, such as cotton, wool, hay, straw, or leaves, which can be held in place by triangular bandages made of handkerchiefs or by strips of linen, muslin, ribbon, or whatever is at hand. For the *forearm* two padded splints, long enough to take in the hand also, should be applied, one to the front and the other to the back of the limb, slight extension being made by pulling gently on the patient's hand. The splints should be tied on in two or three places, and the whole forearm suspended in a sling which should reach from the finger-tips to beyond the elbow. If it be the *upper arm* that is broken, it may be bound tightly to the side. For a *fractured leg* slight extension should be made from the foot, and the leg lifted on to a pillow which is tied firmly about it, or broad strips of wood may be padded and placed one on either side of the leg and tied securely. If the *thigh* is fractured, the splint should extend from under the arm to the ankle, being bound to the body and to the leg by means of long towels or pieces of sheeting applied at intervals.

For a *fractured clavicle* or *collar-bone* the patient is to be placed flat on his back. When he is to be moved a firm pad should be introduced into the axilla, and the arm bound to the side, with the forearm flexed across the chest: this will prevent the broken ends of the clavicle from rubbing together.

For fractured ribs a broad body bandage applied tightly, so as to prevent motion and deep breathing, is all that can be done besides keeping the patient quiet. The chief danger in the case of a fractured rib is that one of the sharp ends of the bone may pierce the pleura or the lung.

For a *fractured jaw* the teeth should be closed upon one another and a Barton bandage applied. Food should be given with a spoon or through a tube inserted behind the last molar tooth.

Pott's and Colles' fractures are named after the surgeons who first described them. The *Colles' fracture* is a fracture of the lower end of the radius within about an inch of the wrist-joint. A *Pott's fracture* is one in which the fibula is broken about an inch and a half above the malleolus. It is accompanied by a turning of the foot outward, owing either to rupture of the internal lateral ligament or to the breaking off of the tip of the internal malleolus.

Fractures of the *skull* are dangerous in proportion to the amount of injury to the brain resulting from them, and cerebral symptoms should be watched for. Little can be done by the nurse except to keep the patient in a quiet, dark room, with cold applications to the head; no stimulants are to be administered, and a surgeon should be sent for at once.

The wound of a compound fracture must be treated antiseptically. If there be much swelling about a fracture, to reduce it lead-and-opium lotion or fomentations are sometimes ordered. After the swelling has subsided, a permanent dressing is usually put on. The bones are placed in the normal position by manipulation, and displacement is prevented by rendering the parts immovable by means of appropriate bandages.

To be able properly to assist the surgeon in the putting up of fractures, the nurse must be familiar with the necessary appliances, including splints and the different kinds of apparatus for making extension. Splints are made of many different materials. Wood

and plaster are considered the best and are most generally used, although for certain cases leather, wire, or splints made of hard rubber are better.

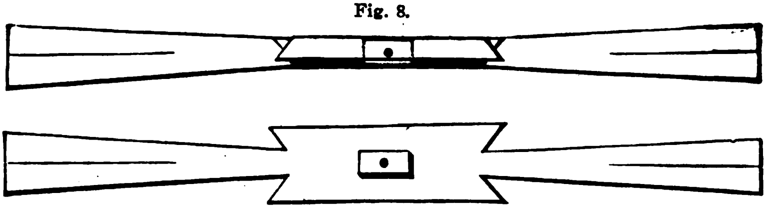
Wooden splints are made of varying thicknesses and sizes; white pine, poplar, and willow are best adapted for this purpose. Before being used, the splint should be well padded with cotton-wool, or layers of gauze may be strapped to it by means of strips of adhesive plaster. The splints must be long enough to include the joints above and below the fracture, and are held in place with bandages. Splints are spoken of as anterior, posterior, and lateral; we have also straight, angular, and curved splints.

Whalebone or strips of gutta-percha of various widths are sometimes padded and placed in dressings to give them additional firmness and strength.

For fractures of the leg between the knee and ankle the plaster-of-Paris splint is often used as a permanent dressing. For fractures of the femur it is generally necessary to employ some means by which constant traction upon the leg can be kept up, in order to overcome the contraction of the muscles, which tends to displace the two ends of the fractured bone. One means of applying this is by the use of *Buck's extension apparatus,* of which several modifications have been introduced. The materials required for this extension are moleskin adhesive straps, bandages, a modified Volkmann slide, the combined bed-cradle with pulleys, weights, and blocks for elevating the foot of the bed, so as to obtain counter-extension by utilizing the body-weight. These appliances the nurse should have ready when the surgeon comes to put up the fracture. The straps should be cut as in Fig. 8, and slipped through

the small cross-bar of wood; each strap should be two inches wide, and long enough to extend up the side of the leg and to include at least the lower third of the thigh. The entire limb should also be prepared by being shaved and freshly bathed. The straps may

Fig. 8.



Buck's Extension Apparatus.

be heated for application by holding them over an alcohol flame or by pressing the non-adhesive surfaces against a hot-water can just before they are to be used.

Where the movement of a limb is to be restricted, sand-bags are used: these are made of ticking of different lengths and covered with rubber cloth. The weight of the bed-clothes is removed by means of the bed-cradle.

The Bradford Frame.—By this surgical apparatus we are able to secure practical immobility of the whole body. It consists of a rectangular frame made of gas piping a few inches longer than the patient for whom it is intended, the breadth equalling that from tip to tip of his shoulders. The frame is covered with two broad strips of canvas which are fastened around the piping in such a way that the canvas is stretched tight. By these means the sagging which would occur with a mattress can be prevented. Between the two strips an opening is left which corresponds to the position of

FIG. 9

THE BRADFORD FRAME

the buttocks. The patient lies upon the frame, to which he is confined by means of a towel pinned over the hips and by straps stretched obliquely over the shoulders. The opening is left so that the frame and patient may be lifted as one piece when it is necessary for him to be placed upon a bed-pan. These frames are used chiefly for hip-joint cases in children, when it is necessary that the child's body should be kept fixed while an extremity is undergoing extension. They are sometimes very useful in cases of fractures, and also for confining children when absolute quiet is desirable after any operation.

The various splints, forms of extension apparatus, braces for deformities and the different ways in which they are used should be made the subject for special demonstrations in the class-room.

Dislocations.—A dislocation is the luxation or displacement of one or more of the bones of a joint. A dislocation may be simple, complete, compound, or complicated.

A *simple* dislocation is one in which displacement has taken place, with a minimum of injury to the surrounding tissues.

It is *complete* where the bones which enter into the formation of the joint are entirely separated from each other.

In a *compound* dislocation the tissues and skin are torn apart, as in compound fractures. Besides these, the terms *recent* and *old* are used; in the latter, inflammatory changes have, as a rule, taken place, which interfere with reduction. A dislocated joint will present a deformed appearance, and the displaced bone will form a projection near by. Dislocations are

very painful accidents, and in most cases there is little that a nurse can do beyond supporting the part and applying cold evaporating applications to keep the inflammation in check until the surgeon arrives. Simple dislocations are usually reduced by manipulation or by extension; where there is much muscular resistance, chloroform or ether is given to complete anæsthesia. When a dislocation has been reduced, the part should be supported with bandages until the relaxed or torn ligaments become firm and strong again. A dislocated jaw may be reduced by protecting the thumbs well, and then placing them in the mouth on the lower molar teeth on each side, and pressing firmly downward and backward, when the bones will slip into place.

Sprains or wrenches of joints are caused by a twist or by a blow which may be direct or indirect; the injury consists in the rupture of a greater or less number of the fibres of the ligaments. The symptoms are severe pain, inability to use the joint, swelling, heat, and later discoloration from effusion of blood.

For minor sprains the treatment consists in giving rest to prevent increase of the inflammation, elevation of the limb to lessen the blood supply, the use of hot applications, or cold evaporating lotions to the swollen part, massage and support with a pad and a firm bandage between times. Lead-and-opium lotion is frequently ordered. Gauze may be soaked in it and applied, the part being covered with oiled silk to prevent evaporation. Where there is not much swelling a plaster-of-Paris bandage is sometimes applied at once in order to secure absolute rest.

Burns.—Strictly speaking, a scald is an injury to

the tissues produced by contact with moist heat, whereas a burn is caused by dry heat. Burns are classified as of the first, second, and third degree respectively, according to the depth to which the tissues are involved. This classification, however, does not teach us much, as a burn of any degree may prove fatal through shock if a large surface of the body has been injured. A superficial burn, for instance, involving a third of the body, more especially if the patient be a young child, will almost certainly prove fatal, while a very deep burn, provided it be localized, may not be so serious, unless important nerves or vessels have been destroyed. Where symptoms of shock are present, contitutional treatment should at once be instituted, as the danger to life is great.

A burn of the first degree is one in which only the superficial layer of the skin is reddened with slight vesication; burns of the second degree extend through the true skin; while in those of the third degree the injury goes beyond the subcutaneous and involves the deeper tissues.

After treatment of the shock, the next important thing to remember is *exclusion of the air,* as this will tend much to allay the pain. In superficial burns, where the skin is not broken, bicarbonate of soda should be sprinkled thickly over the burn, the part wrapped in moist gauze, lint, or linen, over which a layer of common cotton is applied and held in place with a bandage. Flour may be used instead of the bicarbonate of soda. These two remedies are easily obtained, and are efficient. The objection to powder of any kind where the skin is broken is that it forms into hard cakes and is difficult to remove. Applica-

tions in liquid form are therefore better, or gutta-percha tissue, perforated here and there, may first be laid over the burn, and then over this a layer of cotton, which can be kept in place by a bandage or by a coating of celloidin or collodion. If there are vesicles, they should be snipped open with sharp scissors or a knife at the lower edge, and the fluid absorbed with gauze or cotton spanges; gauze or lint pads may then be wrung out of a saturated solution of bicarbonate of soda or boric acid and applied. For superficial burns or excoriations equal parts of zinc ointment and olive oil are very efficacious. The various oily dressings most frequently used are Carron oil, ointments of zinc oxide, bismuth, or boric acid, and simple or carbolized sweet oil. The ointments are best spread on sheets of lint or protective, and changed before the odor becomes offensive. Carron oil, which is made of equal parts of lime-water and linseed-oil, becomes exceedingly disagreeable, and the oil in it stains the bed-linen. It is not so much in vogue as formerly. To prevent deformities from contraction, splints and bandages are used. Where the burn heals by granulation, if the granulations become exuberant and we have the so-called "proud flesh," they may be touched with a stick of nitrate of silver.

The system should be supported by a liberal light diet, particularly where there is much discharge. In connection with burns there may be brain disturbances, as delirium or a meningitis; pneumonia and bronchitis are also complications to be watched for, and inflammation or ulceration of the intestines, particularly of the duodenum, occasionally follows. The fæces should be examined, especially if there be any pain in the

abdomen. Suppression or retention of the urine is not uncommon. When the air-passages have been scalded by steam or hot liquids, the results are generally serious; the steam from lime-water, not too hot, may be inhaled to soothe the injured tissues.

Continuous warm baths are now often used with very good results where the deep tissues are involved and sloughs and charred material are to be removed. Where convenient, we may begin with a warm tub-bath, with boric powder added to the water, which is excellent for its stimulating effects, for relieving the pain, and for cleansing the surfaces before the application of the dressings.

For burns from acids, bicarbonate of soda, chalk, whiting or some other alkaline powder is sprinkled over the surface of skin and covered with moist compresses of gauze. Egg albumen is also used. Alkaline solutions are applied if the skin is broken, and the main treatment is like that of other burns. For burns produced by caustic alkalies, a mild acid solution, vinegar or dilute acetic acid, is used. Where healing is slow or the raw area is very extensive, skin grafting is resorted to later on.

The nurse may meet with cases of *severe exhaustion from exposure to intense cold.* The symptoms are something like those of the later stages of intoxication from the abuse of stimulants. An intense drowsiness may result in coma, from which the patient never awakens. In a case of *frost-bite* the vitality may be only partially destroyed. The patient should be kept in a cold atmosphere or put into a cold bath, and the part rubbed with snow or ice until sensation is felt and the color returns: the rubbing is then discontinued

and ice-water compresses are applied. Stimulants, brandy, coffee, and hot drinks, are given, but external heat is only gradually permitted, since the restoration of the circulation can only come about very slowly in the frost-bitten parts, and in trying to hasten it too much we run the risk of producing, or at any rate increasing the tendency to, gangrene of the tissues.

Foreign bodies in the nose are seldom found except in children, and consist of buttons, stones, or anything small and round that they can push in: they are not generally dangerous, although they are apt to produce inflammation if not removed at once. Peas or beans become enlarged after a short time by imbibition of water, and cause pain by pressure. It will probably be necessary to call in a surgeon, but simple means may first be resorted to, such as making the child sneeze, or by telling it to take a breath and then to close the empty nostril and mouth tightly and force the air out through the obstructed nostril. If these means do not dislodge the object, a small piece of wire may be looped around it or it may be syringed out.

Foreign bodies between the eyeball and one of the lids will cause a great deal of irritation, and in fact will soon set up inflammation. If the particle be sharp, like a sliver of glass or steel, it may become lodged upon the surface of the eyeball, it can be extracted only by a surgeon; but when it moves loosely under the upper lid, as a rule, it may be removed by taking the upper lid between the thumb and index finger and drawing it well down over the lower lid, pressing it there for a moment, and then letting it slide back: the particle will generally be left on the

cheek. If not successful the first time, the procedure may be repeated, or the upper lid may be everted by turning it up over a pencil or any small rod and exposing the inner surface, so that the object can be seen and wiped off with soft linen or a camel's-hair pencil. Sometimes it is possible to draw it up into a medicine dropper. Any irritation may be allayed by instilling into the eye a few drops of a half-saturated solution of boric acid; with children a few drops of a 1 per cent. solution of cocain are used to prevent them from shrinking during the process of extraction.

Another place into which foreign bodies find their way is the external ear. They should be removed at once, as they are liable to cause inflammation. If a physician cannot be found, the nurse may attempt the removal by syringing out the ear, but unless she has had a great deal of experience she should never use a probe or forceps, since special skill is required in these manipulations lest the tympanum be injured or the object be pushed in still farther. If an insect should become lodged in the ear, a piece of cotton-wool should be saturated in a strong solution of salt or vinegar and the cavity completely filled with it. The patient should then lie on the ear with the cotton in it, at the same time pressing the hand firmly over it: the plug may be withdrawn after a short time, when the insect will probably be found on the cotton. Another way is to place the patient on the other side, with the affected ear upward: the tip of the ear is drawn up to straighten the tube, and warmed oil is poured in, when the insect will probably float on the surface of the oil. To syringe out the ear the patient holds the ear downward and the water is allowed to

run in very gently, being directed toward the upper and posterior part of the canal.

An obstruction in the throat is not very easily removed. The first efforts usually made are to try to dislodge the object by striking the patient forcibly between the shoulders with the palm of the hand, or the child may be held head downward, and the slapping repeated. If the object is in the œsophagus or gullet, a drink of water or a swallow of bread may push it down. If not too far down in the throat, an attempt to remove it with finger, forceps, or an umbrella probang will probably be made. Anything in the air-passages may be coughed up. Fish-bones, if imbedded in the mucous membrane, must be removed with instruments by the surgeon. Even when a pin or bone has been swallowed, it may have scratched the mucous membrane on its way down, and may leave the patient with a sensation which makes him believe that the foreign body is still present in the throat, so that even after a careful laryngoscopic examination has proved its absence he may still decline to be convinced that it has been gotten rid of.

If any hard foreign substance has been swallowed, it is best to let it alone, as it will be carried through the alimentary canal. For anything sharp, such as a pin or piece of glass, purgatives should not be given, but, instead, the patient should be made to eat solid foods, such as bread, in which the object may become imbedded and be carried off without injuring or perforating the coats of the intestines.

The *Roentgen Rays,* or as they are more commonly called the X Rays, are now used to a very considerable extent in hospitals for diagnostic as well as for thera-

peutic purposes. By their aid it is possible to see through the fluoroscope and obtain by means of proper plates photographs of opaque bodies, so that fractures or dislocations of the bones, calculi, aneurismal or other tumors and enlargements of solid organs can be made out readily by an expert. The X Rays are now used successfully in the treatment of many skin lesions—acne, lupus and other superficial growths, even when these are of a cancerous nature. For deep-seated cancers or other tumors, however, they are not effectual so far as inhibiting the process is concerned, although occasionally they bring about more or less alleviation of the pain.

CHAPTER XX.

HÆMORRHAGES.

Hæmorrhages might properly be classed under the head of emergencies, as they very frequently occur when least expected, and their treatment requires prompt action coupled with presence of mind and calmness. By word, sign, or look, a nurse should never let the patient know that anything unusual or dangerous has occurred: her manner should be quiet and reassuring, though she should fully realize that the bleeding must be controlled as quickly as possible, and adapt her procedures to the necessities of each case.

Hæmorrhage may be defined as the "escape of blood from any part of the vascular system, with or without rupture of the coats of the vessel." Hæmorrhages are arterial, venous, or capillary, but in severe cases the bleeding may be from all three sources at once. When a hæmorrhage occurs in connection with wounds, it is called *traumatic* (relating to a wound or injury); when, however, it occurs as the result of a diseased condition, and is not directly attributable to violence, it is said to be *spontaneous*. The loss of blood may cause more or less danger according to the size of the injured vessel and its distance from the heart. Hæmorrhages may be external or internal, and are to be combated by local or constitutional treatment, or by the two combined.

The means by which the arrest of hæmorrhage is brought about are of two kinds: (1) natural and (2) artificial.

Hæmorrhage from any of the large arteries is always serious and, unless checked promptly, sometimes results fatally in a very short time. Arterial blood is to be recognized by its bright red color and by the fact that it comes out in spurts or jets corresponding in time to the contractions of the left ventricle, which force the blood through the arteries.

A venous hæmorrhage differs from one which comes from an artery in that the blood is of a dark and purplish color and flows in a steady, slow stream; it is more easily controlled and less dangerous than an arterial hæmorrhage, unless a large vein has been severed.

In a capillary hæmorrhage the bleeding comes from the capillaries, which are interposed between the endings of the arterioles and the beginnings of the venules. In this case there is not so much a spurting as an oozing of the blood, which, however, at times may be very difficult to control.

The constitutional symptoms of a severe hæmorrhage are well marked, and, where the bleeding is internal or comes from a wound covered by a large dressing, they may be the first to appear, and should therefore be carefully watched for. The pulse, which varies in frequency and tension according to the amount of blood lost, will give us valuable information as to the condition of the heart, and enable us to form some idea of the imminence of the danger. Where the hæmorrhage has been severe, the lips have a pale, drawn look; the whole face is pallid and wears an anxious expression; the pupils are dilated; there are

signs of restlessness; the body is bathed in a cold perspiration and the extremities are cold and clammy; the nails and finger-tips look blue, and the respirations gradually become weaker and shallower, until finally they are sighing; the patient complains of dizziness and extreme weakness; the speech becomes thick and unintelligible, or may even be entirely lost. These symptoms are followed by unconsciousness, from which, if the loss of blood has been very great, the patient is never aroused, but dies in a state of collapse. Syncope or fainting is a desirable condition if it comes on early enough, as the bleeding ceases with it, and an opportunity is thus afforded for the blood to coagulate, by which means the mouths of the bleeding vessels are closed before the heart's action regains its normal strength. The coagulum which forms, when the blood-current is slow and the bleeding surface is exposed to the air, acts as a natural plug at the ends of the ruptured vessels. In the case of a vein, where there is no such propelling force to dislodge the clot, the vessel, as a rule, quickly closes, but in arterial hæmorrhage the plug formed is liable to be dislodged from the end of the artery with the subsequent heart-beats. Fortunately, however, Nature has provided for this, since the arterial walls have the power to contract and retract, thus lessening the size of the outlet and preventing the displacement of the clot.

In the arrest of hæmorrhage by natural means the following factors are concerned:

1. Clotting of the blood;
2. A weakened action of the heart, sometimes shown by fainting;
3. Changes in the vessels themselves.

By artificial means hæmorrhage is arrested by—

1. Position (elevation of the limb or part);
2. Pressure directly on or above the vessel, including acupressure;
3. Forcible flexion;
4. Ligaturing or tying the ruptured vessel;
5. The application of heat or cold;
6. Cauterization;
7. The use of astringents or styptics, besides heat and cold.
8. Torsion or twisting.

Pressure is of two kinds—provisional and permanent. In provisional compression, the finger is placed on the bleeding point, or, if it is an artery that has been ruptured, just above it, and kept there until aid comes. Permanent compression may be made by means of compresses and bandages fastened tightly over the wound, or by the Esmarch rubber bandage or the tourniquet applied at any point in the line of the artery between the wound and the heart tight enough to stop, or at least to much impede, the circulation. To prevent bleeding from a limb during an operation an Esmarch bandage is tightly applied from the extremity of the limb to a point at some distance above the seat of operation. Just above it, again, a piece of rubber tubing is tightly wound several times round the limb and fastened. The Esmarch is then removed. By these means the circulation will be so thoroughly arrested as to permit of a practically bloodless operation.

Acupressure is now but rarely employed. This method is carried out by passing a pin or needle through the tissues over the artery, and again through the tis-

sues on the other side, thus making pressure on the vessel. The pin is kept firmly in place by twisting silk or a fine wire over the point and the head of the pin in the form of the figure 8. The pin is usually removed in six or eight hours, after the clot has become firm.

Ligatures are sometimes used in cases of accidental hæmorrhage, as well as for tying the ends of vessels which have been severed during operations. The end of the artery nearest the heart is picked up with a pair of forceps and tied firmly with a silk or catgut ligature. The latter is generally preferred in abdominal surgery where the wound is closed, as it is absorbed. Ligatures are usually cut eighteen inches long. For tying ligatures the square or "reef knot" is used. The nurse should have ready for the surgeon, when he arrives, artery forceps, scissors, sponges, ligatures, and dressings.

Cold is frequently employed, as it causes the arterial walls to contract. Ice is the most convenient form in which to apply it: sometimes douches of ice-water are used, or cloths wrung out of ice-water and placed over the bleeding part are sufficient where the hæmorrhage is slight. An ice-bag half filled with pounded ice, laid over the parts in the neighborhood of the bleeding vessel, will sometimes serve the same purpose. Heat is seldom applied except in the form of very hot douches for uterine hæmorrhage, the temperature of the water being from 115° to 120° F. The actual cautery is, however, sometimes used during operations to check oozing, especially in abdominal surgery.

Besides heat and cold, there are other styptics or agents for the arrest of hæmorrhage, which are used in

a powdered or liquid form. In some cases, especially in nose bleed, a solution of adrenalin chloride is very efficacious. Monsel's solution of iron is very effective but dirty: it can be applied with a camel's-hair brush or on a pledget of cotton or gauze. Sometimes the powdered perchloride of iron is thickly sprinkled over the bleeding point. Alum and tannic acid are also well-known styptics, and in an emergency vinegar or common salt often does good service.

Torsion is performed by catching the end of the vessel with the forceps and twisting it two or three times.

Position and *rest* are material aids in stopping bleeding, and where the hæmorrhage is not very extensive, elevation and perfect rest may be sufficient. By raising the limb or the part, the force of the blood-current toward that point will be lessened, and the amount of blood lost will be reduced. This is something a nurse can always do at once. If the bleeding be from the abdomen, the foot of the bed is lifted on to a low table or placed on two chairs, stools, or bricks according to the height desired. If it be from the leg, this should also be supported in an elevated position by pillows or by some other device. If it be from the forearm or hand, the part is to be raised above the head; or *flexion* of the forearm on the arm will often answer. A firm pad is put in the hollow of the elbow, and the forearm is bent tightly against the arm and held in place by a stout bandage. If the hæmorrhage comes from the leg or foot, the thigh is flexed upon the abdomen and the leg upon the thigh, and held firmly in this position as long as is necessary.

Rest should be maintained during and for some time

after a hæmorrhage, as any movement will increase the heart's action and thus augment the flow of blood, or where the bleeding has stopped it may bring it on again by displacing the blood-clot which is forming or has already formed at the mouth of the vessel.

Traumatic hæmorrhages are classed as (1) primary, and (2) secondary. *Primary haemorrhage* is that which occurs at the time of the injury or operation. *Secondary haemorrhage* may occur at any time from twelve hours up to ten days or two weeks after the operation or injury. It may be due to the slipping of a ligature or to the separation of sloughs. After an amputation or a serious operation of any kind, where many large arteries have been severed, a constant watch should be kept during the first forty-eight hours, as there is always a tendency to hæmorrhage during the period of reaction. A little oozing does not necessarily mean a serious hæmorrhage, but if the stain on the dressing continues to grow larger and is of a bright-red color, instead of becoming paler, then hæmorrhage is taking place, and the nurse must decide for herself whether or not the surgeon should be summoned at once. If she is doubtful, it is always better to be on the safe side. The pulse is probably the best guide. In a case of severe hæmorrhage the dressings may have to be removed and the vessel tied. The nurse herself should never leave a patient who is having a hæmorrhage, but should send some one else at once for the surgeon, and in the mean time she should do what she can to control the bleeding by first exposing the wound to the air and making pressure over the bleeding point or in the line of the main artery leading to it. The part should be kept elevated, and, later on, permanent

compression can be applied by means of an *improvised tourniquet.* This is made by placing a firm pad, such as a roller bandage, over the wound or just above it in the course of the artery, and then tying a bandage or a handkerchief, folded diagonally, loosely around the limb; a short stick is next slipped under the knot above the compress, by the help of which the bandage can be twisted as tightly as we desire. The use of the tourniquet, however, for any length of time, is liable to increase the tendency to shock, whereas properly applied pressure over the bleeding point is generally effectual and leaves no bad results.

Even when the bleeding has stopped it is sometimes necessary, in order to keep up the required blood-supply to the brain and respiratory centres, to lessen the amount in the extremities by bandaging them either with an Esmarch rubber bandage or with ordinary bandages tightly applied. Enemata of hot salt solution or the subcutaneous infusion of warm salt solution are often used by the surgeon, and should be ready on his arrival.

After the hæmorrhage has ceased heat should be applied externally. The patient should be kept quite free from excitement and in ignorance of the amount of the bleeding or the degree of the danger to which he has been exposed. The responsibility of giving the patient information on either of these points rests with the doctor, not with the nurse.

Haematuria, or blood in the urine, may have its origin in the kidneys, ureters, bladder, or urethra. If the blood be from the kidneys, it will be diffused throughout the urine, giving to the whole amount a uniform reddish color. Hæmorrhage from the ureters

most frequently results from the passage of a renal calculus which has torn the mucous membrane. When the bladder is the source of the bleeding, most of the blood comes away at the end of micturition in small clots, and one does not see the intimate admixture of blood and urine which occurs in renal hæmorrhage. When the hæmorrhage is from the urethra, the blood precedes the flow of urine. These conditions should be noted by the nurse and reported, and it may be laid down as a general rule that when an evacuation of an unusual nature comes from any internal organ, it should be kept for the inspection of the physician.

Epistaxis, or nose-bleed, is a very frequent form of hæmorrhage but is rarely dangerous; it may, however, be difficult to check. The onset is not infrequently preceded by a sense of fullness in the head, accompanied by more or less vertigo. The chin should be kept elevated and the head never allowed to drop forward. If the bleeding is from only one nostril, the arm on that side is to be elevated and ice-water or ice applied to the back of the neck and forehead. A 1 to 5000 solution of adrenalin chloride may be used as a spray or applied on absorbent cotton. Ice-water or strong salt solution (1 drachm of salt to 4 ounces of water) may be injected; finally, where all other methods fail, the nares must be plugged. A small soft rubber catheter, a piece of linen thread, or cord, and a small roll of lint or a sponge are needed. The thread is passed through the eye of the catheter, and the catheter introduced through the nostril into the throat: the string is then caught with forceps and drawn out of the mouth, so that the plug or sponge can be attached; the catheter is then withdrawn from

the nose and the pledget pulled into position. The two ends which come from the nostril are tied over a second plug which fills the opening. It is usual to have the string long enough, so that after tying around the sponge we can leave an end to come out through the mouth on to the cheek, where it may be fastened with a bit of adhesive plaster. This facilitates the removal of the plug. The nurse is seldom called upon to adopt these measures, as the procedure is at times quite a difficult one, requiring the experience of the surgeon, and the foregoing description has been inserted here chiefly that everything, which may possibly be required may be ready in case of necessity.

Ecchymoses are due to extravasations of blood from small vessels into the surrounding cellular tissue, and usually follow blows and contusions.

To *pack the rectum* for hæmorrhage a piece of gauze or lint is inserted, pressure being applied at the centre, so as to make a sort of bag, which is packed with cotton, strips of gauze, or compressed sponges, the ends of the bag being allowed to project from the anal orifice. Within the sphincter the rectum forms quite a large natural pouch, which requires a considerable mass to fill it. This arrangement of the packing makes its removal easy when it is no longer needed.

Uterine haemorrhage may occur from many causes—*e. g.* during pregnancy or after delivery, in various pelvic diseases, or as a consequence of operations. Those occurring previous to labor—ante-partum hæmorrhages—are frequently connected with miscarriages or a placenta previa. A serious form of internal hæmorrhage is that from rupture of the blood vessels

in ectopic pregnancy. The patient generally complains of sudden and excessive pain in the lower abdomen, and may speedily pass into a state of collapse. As a rule in these cases only a small amount of blood escapes from the vagina. The patient should be put to bed at once, kept perfectly quiet, and the physician sent for. Post-partum hæmorrhage will be considered in the chapter on Obstetrics.

Hæmorrhage from the genital tract after gynæcological operations may usually be controlled at once by packing the vagina. Strips of gauze are prepared, the necessary instruments are sterilized, and the packing is done by the surgeon: until his arrival the nurse may give hot douches, as hot as 115° to 120° F.; the foot of the bed is to be elevated, and the patient kept quiet. If the bleeding be profuse and the services of a physician cannot be obtained, no valuable time should be lost, and the nurse must undertake the packing herself. This can best be carried out by placing the patient in the Sims or in the dorsal position. The posterior vaginal wall is carefully retracted by means of a Sims' speculum, and the gauze is carried well up into the vagina by means of a long pair of forceps.

When a patient has fainted after a profuse hæmorrhage, the head is to be kept low, but no stimulants or hypodermics are to be given without a direct order from the surgeon, since they increase the force and frequency of the heart's beat and tend to dislodge the clots, which may be forming at the mouths of the bleeding vessels. In rare instances, and where there is danger of collapse, the surgeon may think it best to order stimulants as being the lesser of two evils.

Arterial haemorrhage, as we said, is best arrested

by pressure or by ligature. If the artery is imbedded deeply in the tissues and cannot be reached with the fingers, a graduated compress of gauze or lint is packed firmly into the wound and held in place by a bandage. The amount of hæmorrhage from an artery will depend upon its size and the manner in which it has been cut. An incised wound or one caused by a sharp instrument bleeds more than one made with a blunt instrument, where we have a contused or lacerated wound, because the ragged edges of the torn artery and surrounding tissues retard the escape of the blood, so that clots tend to form more quickly.

To be able to control hæmorrhage from arteries by pressure it is necessary to know the location of the principal arteries and how to reach them. The student nurse is expected to familiarize herself with the larger arteries during her study of anatomy, and with the manner of compressing them: the latter can only be learned by practising the methods after they have been demonstrated.

Venous haemorrhage is arrested by pressure below the wound—that is, on the side distant from the heart. Large veins, like the jugular, should be compressed both above and below the wound. This is necessary for two reasons: first, because the vein may bleed from both ends; and secondly, because (what is held by many to be even more dangerous) air may enter at the proximal end and cause sudden death. Unless it be a large vessel which has been ruptured, the danger from a bleeding vein is not so alarming as that from the rupture of an artery of the same size, and compression will usually suffice to check the hæmorrhage. When varicose veins of the leg rupture, the limb

should be elevated in addition to making compression. To prevent such an accident a rubber stocking is usually ordered, as it makes equable pressure along the vessels, supporting the walls and helping the circulation.

To control bleeding from the capillaries the wound should be exposed to the air, the part, if possible, elevated, and compression made by means of cold compresses and bandages. This is not a dangerous form of bleeding, but is sometimes troublesome to control.

A *haemorrhage diathesis* is a predisposition to bleeding caused by an abnormality in the structure of the walls of the vessels: in persons who have inherited this abnormality, the slightest wound may result in fatal bleeding. Sometimes one will meet with whole families of these "bleeders."

For bleeding from the umbilicus in new-born infants, a little powdered perchloride of iron or alum may be applied.

Internal hæmorrhages may result from various causes: the most common ones are those from the lungs, stomach, intestines, and pelvic organs.

The blood in *haemoptysis from the lungs* is characterized by its bright-red color and the frothy appearance which it acquires from the admixture of air-bubbles; a spasm of coughing usually precedes it. If the bleeding is slight, there may be some doubt whether it is from the lungs or not, since it may have come from the mouth or throat. This symptom is always more or less grave, but unless large blood-vessels are involved it is not necessarily dangerous. The patient should at once be placed in the semi-recumbent position and kept perfectly quiet and free from excitement. Small pieces of cracked ice may be swal-

lowed whole or allowed to dissolve in the mouth, and a light ice-bag or an iced compress should be laid over the chest. The feet should be kept warm. The patient must be warned not to speak or to attempt to swallow food, since even these movements may increase the hæmorrhage. The physician should be called at once, and he will probably, if the hæmorrhage be marked, order a dose of morphin. After any severe hæmorrhage a warm solution of sterilized salt solution should always be prepared before the arrival of the physician.

Haematemesis means the vomiting of blood. The blood is generally dark red in color, often resembling coffee-grounds, and is mixed with particles of food. The patient should lie down and keep quiet; nothing should be given by the mouth but ice-water compresses or an ice-bag may be applied over the stomach. The nurse should try and make sure that the blood has not originally come from the nose and been swallowed and afterward vomited.

Hæmorrhage from the intestines, or *enterorrhagia,* may come from various causes, frequently from ulceration of the coats of the intestine, as in typhoid fever, in dysentery, acute or chronic, from internal hæmorrhoids, or from carcinoma of the intestine. Cold in the form of cold-water injections or a piece of ice introduced into the rectum, ice-cloths or an ice-bag applied to the abdomen, are sometimes ordered, with elevation of the foot of the bed and perfect rest. Ergot is of doubtful value, but the physician may order opium, not only to control the peristaltic action of the intestines, but to allay the pain (if any be present) and at the same time to quiet the fears of the patient.

CHAPTER XXI.

SURGICAL OPERATING-ROOMS.—NURSE'S TECHNIQUE.—HOW TO PREPARE FOR OPERATIONS IN PRIVATE HOUSES.

As the technique of the operating-room has come to have such an important bearing on surgical operations, and as the nurse is often depended upon to prepare everything required, and to see that everything in the room is in a condition of cleanliness and order, her duties in this special work will be dwelt upon in detail.

According to the plan outlined in the first chapter of this book, the bacteriology connected more particularly with the subject should be taught didactically and with demonstrations at the same time, so that as the pupil advances in her practical work she will understand the full significance of the unremitting absolute cleanliness, care and precautions against infection in relation to patients that are insisted upon at each step. Thus by the time she has gone through a year and a half's training in the hospital she should be sufficiently well grounded in the principles of asepsis to appreciate the full meaning and importance of the surgical technique which is carried out in all its minutiæ in the operating-room.

Surgical technique means the refinement of cleanliness applied to everything and every person that in any way or shape comes in contact with the field of operation; for success in surgery is quite as dependent upon a faultlessly aseptic technique as upon the skill

of the operator. To carry this out is a simple matter in itself, but there is always danger lest a lack of appreciation of the momentous results involved in each little detail may lead to carelessness and disaster. To bring about surgical cleanliness we may employ (1) sterilization, by means of dry or moist heat at a certain temperature; (2) mechanical means—brisk scrubbing with soap and water and a good hand-brush; (3) chemical means—solutions of certain drugs which act as germicides.

Given conscientious attention to these details an operation loses much of its elaborateness, while the results are gratifying. But let some one make a single break in these links of cleanliness and an infection, always more or less serious, sometimes fatal, is caused by doctors or nurses. Upon the nurse in a great measure depends the responsibility of carrying this surgical cleanliness into effect.

To ensure thoroughness in the antiseptic preparations, one nurse should be given the responsibility of the care of the operating-room—a task which is usually sufficient to occupy her whole time. Any further assistance which is needed, should be rendered by the pupil nurses of the school, who receive their operating-room training in this way. The pupil nurse thus works under the direction, observance, and criticism of the nurse in charge, upon whom devolves the responsibility of rendering surgically clean everything in the operating-room that is likely in any way to come in contact with a wound. This duty includes the care and sterilization of instruments, the preparation of solutions, ligatures, dressings, operating-room linen (including the surgeons' operating suits and nurses' dresses), and the an-

tiseptic care of the room; all this work necessarily demands a thorough knowledge of the details of the preparation for any kind of operation.

The first step in the nurse's work is the care of the operating room. The location of the room is important, for the higher it is above the ground the less the contamination from the air and from the dust of the streets, and the easier it is to obtain a good light. It should not be too large, on account of the frequent cleanings that are necessary. The walls and the ceilings should be rounded; there should be no angular corners. The walls may be lined with marble, but tiles or porcelain can be equally well cleaned. Where cheaper materials are employed oak or some plain wood should be painted with two or three coats of white enamel. There should be one or two large windows on one side of the room and a skylight to admit the greatest amount of light possible. The flooring should be of tiles or of paraffined hardwood, and should slant towards the centre or sides so that good drainage can be obtained. In the latter case there should be depressions in the floor at the sides to carry off the water. A flooring of white marble mosaic in three-quarter-inch cubes imbedded in cement and then polished is excellent.

In the Vienna Institute a Dutch-French substance called "Ripolin" has proved very satisfactory. It has often been subjected to a temperature of 100° C., and while the original white color has turned a little yellow, blistering or scaling has not occured. Ripolin is, therefore, far more durable than white enamel paint.

The furniture is now usually made of glass or of enamelled iron. It should be as simple as possible.

There should be an operating-table, tables or stands for the instruments and the basins, the irrigating stand, and the stationary hand-basins, together with glass shelves for the various solutions and dressings, medicines and vessels. Connecting with the main operating-room or adjoining it are a set of small rooms which are to be used for the instruments, the sterilizers, the supplies in general, and for the preparation of bandages, dressings and solutions. Another room is set apart for the administration of anæsthetics. In this room there should be a narrow rolling table which holds the necessary outfit—the inhalers for ether and chloroform, the tongue forceps, sponges, towels, basins, whiskey, brandy, strychnin, digitalis, atropin, aromatic spirits of ammonia, hypodermic syringes and needles. This tray or table should be wheeled into the operating room and kept in readiness in case of an emergency. There should also be an oxygen inhaler, an electric battery, a Paquelin cautery and the apparatus for giving saline or other infusions. Dressing-rooms for the doctors and the nurses, a waiting room for the friends of the patients, a visiting room and toilet conveniences should be close at hand. Some surgeons prefer that the cleaning of the hands and forearms should be done in a room next to the operating room. In this case a room fitted up with the necessary wash basins and provided with an abundant supply of hot and cold water is needed. The aseptic care of the operating room requires that everything should be kept in perfect order and quite clean. The walls should be wiped down once a week; the woodwork and furniture should be washed with hot soap-

suds each day, and the whole room well scrubbed frequently.

Whenever a patient in whom a septic condition is present has been operated upon, the operating-room and all its furnishings should be well cleaned and wiped with a cloth soaked in a 1:20 carbolic acid solution. In addition to this the room should be well aired. Some surgeons make it a rule never to operate except in emergency cases for two or three days after dealing with an infectious or septic case. If it is possible to thoroughly close up the cracks in the doors and the window-sills, the room may be sterilized by means of the formaldehyde apparatus. This method, however, is relatively expensive and, unless thoroughly carried out, is not so efficient as the procedure mentioned above.

Sterilizing Apparatus.—All well-equipped operating rooms have a sterilizing apparatus. Steam heat under pressure in an autoclave is much employed. There should also be metal tanks for containing hot and cold water which has first been sterilized by means of a steam coil surrounding the under lining of the tank. Before this water is used for making the various solutions it should be strained into clean bottles through absorbent cotton placed in a glass funnel. If an autoclave is not available for sterilizing purposes an Arnold steam sterilizer is all-sufficient, as it is quite large enough to hold bottles of salt solution, dressings or instruments. In a general operating-room not less than two of these sterilizers are needed, each supplied with a Bunsen burner and gas tubing.

Dishes.—The dishes needed for operations vary in size and shape. They are used to hold the various

solutions for the disinfection of the hands and instruments, and some should be reserved for the reception of specimens. Those made of glass are decidedly preferable, but if these are not obtainable, vessels of white porcelain or porcelain-lined ware will serve all practical purposes. When the porcelain begins to chip off a new vessel must be substituted, as it is impossible to be sure that a chipped dish is surgically clean. All such dishes, after an operation, should be washed in hot soapsuds, and then in clear hot water, being afterwards allowed to drain, since if they are wiped off bits of lint from the linen are apt to cling to the surface. The instruments are placed in dishes filled with sterilized saline solution; or what is still better, the dishes are filled an hour before the operation with a 1:1000 bichloride solution, and just before the operation are emptied, rinsed out with sterilized water, and again filled with sterilized water, in which the instruments are received.

Instruments.—The operating-room nurse should familiarize herself with the names of the instruments ordinarily used in surgical operations, and be able to select the sets used for the different cases. To prepare instruments for use, they are placed in a copper or porcelain-lined kettle filled with a one per cent. solution of sodium carbonate, which is allowed to boil for five minutes, after which they are lifted out and at once transferred to the dish containing the sterile solution. This is a very convenient method of preparing instruments quickly for a second operation. In order to prevent rust the instruments should be cleaned and dried immediately after an operation. The scissors and other paired instruments should be taken apart.

They are first washed and scrubbed very carefully in warm soapsuds; any tarnish being removed with fine sapolio. Finally after being rinsed off in clear warm water, they are boiled for five minutes, and then carefully dried. The blades of cutting instruments and hypodermic needles should be wrapped in a thin layer of absorbent cotton to prevent dulling. The needles after being thoroughly dried should be passed through a double layer of gauze in which they remain until needed again. Instruments of aluminum should not be placed in alkaline solutions.

Solutions.—In addition to the regular disinfectant solutions (carbolic acid and bichloride of mercury) other cleansing agents are now used in operating-rooms for various purposes. Of these the most important are salt solution and distilled water, which have superseded chemical solutions except for the disinfection of the hands and for septic conditions.

Normal salt solution, the preparation of which is described elsewhere, is used for infusions and irrigations as well as for keeping the field of operation free from blood where sponging is contra-indicated. Rubber tissue, which is to be used for covering skin-grafts, is kept in normal salt solution until it is to be applied. Besides its cleansing properties, this solution has been proved to act as a stimulant to the tissues, the red corpuscles being preserved in it, whereas they are destroyed by plain water.

Distilled water, when needed in large quantities, can be most readily obtained from a boiler-room, the steam from the boiler being allowed to condense. It is frequently used instead of disinfectants for covering instruments, and in the place of boiled water for pre-

paring salt solution. Before the operation it is reheated to whatever temperature is desired.

Suture Materials and Ligatures occupy an important place in surgery. Ligatures are of various kinds and sizes. They are made of silk, silkworm gut, catgut, and silver wire.

To clean the glass reels or spools upon which ligatures are wound, a good scrubbing with green soap and water and immersion in a 1:500 bichloride solution for twelve hours is effectual.

Silk Ligatures.—The heavy silk ligatures are cut into lengths of 100 cm., those of intermediate size into lengths of 40 cm., and the "carriers," or those of fine quality, into lengths of 50 cm. Four strands of the heavy silk are wound together on one spool, ten of the intermediate on a second, and eight of the fine on a third reel. For sterilization, a test-tube large enough to hold four reels is used, a little cotton being placed in the bottom of it. The tube is then plugged with cotton and steamed in the sterilizer on three successive days—for one hour on the first, and half an hour on each of the two following days. The spools are to be kept dry, and the plug must never be removed until the ligatures are needed.

Catgut Ligatures.—Catgut, if it could always be depended upon from the standpoint of sterilization, would hold the first place as a ligature and suture material as, when buried in the tissues, in the course of time it becomes absorbed. The Cumol method of sterilizing catgut, as recommended by Kronig and modified by Clark and Miller, has been proved to be the safest. The method is as follows:

1. Cut the catgut into the desired lengths, and roll

twelve strands in a figure-of-eight form and tie, so that the bundle can be slipped into a large test-tube.

2. Place the tube in a hot-air oven and bring the temperature gradually up to 80° C., and hold at this point one hour.

3. Immerse the catgut in cumol; surround the tubes with a sand-bath; raise the temperature to 165° C., and maintain it at this point for one hour.

4. Pour off the cumol, and either allow the catgut to dry by means of the heat of the sand-bath, or transfer it to a hot-air oven at a temperature of 100 ° C., until all of the cumol is driven off. This substance is very inflammable.

5. Transfer the rings with sterile forceps to test-tubes previously sterilized as in the laboratory.

Catgut both plain and chromicized, prepared by Van Horn, Kiliani and St. John Leavans, can be procured ready for use in sterilized sealed tubes.

Silkworm gut is cut into lengths of 30 cm., doubled, placed in tubes, and sterilized in a 1 per cent. soda solution for five minutes in the same manner as silk ligatures.

Silver wire should be boiled. In dealing with any of these prepared ligatures, thorough antiseptic precautions must be observed; the hands must be carefully prepared, as if for an operation, before touching them, and nothing which is not sterile should be allowed to come in contact with them.

Drainage.—For drainage, rubber tubing of various sizes or strips of gauze and glass tubes are used. The gauze should be cut "by drawn thread" into strips of about a yard long and an inch wide, each of which is made into a little roll: four or more of such rolls

should be enclosed in a glass tube and sterilized in the same way and for the same length of time as silk ligatures. For the same purpose strips of iodoform gauze should be kept ready cut in proper widths. When tubes or materials for gauze drainage are used at a dressing, all handling of them should be avoided. They should always be handed to the surgeon by means of sterilized forceps. Rubber drainage-tubes are prepared by scrubbing them well with soap and water and rinsing them in boiled water. They are then soaked in a 1:1000 bichloride solution for twenty-four hours, after which they are placed in a 1:20 carbolic-acid solution for twenty-four hours, and finally kept in a 3 per cent. carbolic-acid solution, which is to be changed weekly or at least every ten days. Just before they are needed they are boiled in soda solution. Glass tubes are boiled and kept in a 1:20 carbolic-acid solution, and washed off in alcohol before being used.

Dressings are furnished chiefly in the form of rolls of gauze, common or absorbent cotton, or pads. The gauze, which is most generally employed, should always be kept ready, rolled in six-yard lengths, and folded so as to have a width of about nine inches. From these rolls pieces of any size required can readily be cut off. Pads are of various sizes and shapes according to the special requirements of each case. All dressings must be wrapped in towels and sterilized for half an hour before being used. Those that are to be kept on hand some time should be well dried after they have been sterilized and kept in closely covered jars.

The use of *silver foil* as a dressing for certain kinds

of wounds has within the past few years come into favor with surgeons The foil comes ensheathed in papers. Before being used the packages are wrapped in towels and sterilized in the autoclave.

Sometimes gauze is used as a medium for holding chemical substances, such as iodoform or permanganate of potassium.

To make iodoformized gauze.—

Take of

Salt-solution soapsuds.....	180 cc.	(℥vi)
Iodoform powder.........	40 cc.	(ʒx)
Sterilized gauze..........	3 yards	

Mix thoroughly. Fold the gauze lengthwise with a width of nine inches and dip into the mixture. Rub the solution well into the meshes. When the gauze is thoroughly impregnated, place it on a clean rubber cloth and roll it up loosely. Keep in colored glass jars.

Permanganate gauze.—Plain gauze is cut into suitable lengths and sterilized for an hour. It is then dipped into a solution consisting of hot water, 1 litre (Oij), potassium permanganate, 10 grammes (grs. cl.). It is then rolled, as in the case of the iodoform gauze, and kept in a porcelain or dark jar. In preparing gauze the hands should be sterilized as for operations.

Absorbent cotton is cut into uniform sizes. It is then wrapped in a towel, and the bundle having been securely pinned together is sterilized in the autoclave.

Rubber tissue is used for protecting wounds and for securing drainage. It can be sterilized by being boiled in the soda solution.

Sponges for general use are made of gauze, small

squares being cut and the corners folded in, so that small round puffs are made. For abdominal work the sponges are made flat and of several thicknesses. At one corner of each a tape is attached, which is caught in a pair of artery forceps, when the pad is placed in position in the abdomen. In preparing the sponges for abdominal operations bundles containing one dozen of assorted sizes are the most convenient. Each bundle, fastened with a safety pin, is wrapped in a small towel and sterilized. Owing to a miscount a sponge has occasionally been left in the abdominal cavity. To avoid any responsibility for such a mistake the nurse should be particularly careful always to have the correct number of sponges in each package. It is true that the surgeon is ultimately responsible for everything that he places in the abdominal cavity, but the making of the sponges and the counting of them into packages is distinctly the nurse's work. The only safe method lies in the employment of a rigorous routine. At the time of the operation, before any sponges are used they are counted, and if the number tallies with that of the nurse, she is relieved from any further responsibility. Finally before the abdomen is closed, a recount should always be made by the surgeon, and the number must correspond with the original count. To have a fixed number—a dozen in a package—and to have as few packages as possible, will simplify the matter. A record should be made of the number of packages, and the number of sponges in each package at the first count.

Sea-sponges are now seldom used. They may be prepared by first pounding them well to remove the sand, and then washing them several times in water. They are afterwards soaked in a saturated solution of

permanganate of potassium, decolorized in oxalic acid (sat. sol.) or dilute sulphuric acid, again washed thoroughly in warm water and placed in a weak solution of dilute hydrochloric acid (two drachms to a pint of water) for twenty-four hours. After this they are washed in water until the washings are clear, placed in a bichloride solution (1:1000) for twelve hours, washed in hot water and finally kept in a 3 per cent. solution of carbolic acid. Boiling destroys the elasticity of the sponges.

Iodoformized glycerin and iodoformized oil generally contain 5 parts of iodoform to 100 parts of glycerin and oil, respectively:

Iodoformized Glycerin.—

Iodoform ... 5 grammes (grs. LXXV)
Glycerin ... 100 cc. (℥iii circa)

Mix and place in a wide-mouthed, thin glass flask, and sterilize for one hour, plugging the flask afterwards with sterilized cotton. When glycerin is used alone it is sterilized in the same manner. These solutions are used for injections into tuberculous joints or sinuses, and in preparing gauge packings.

Two kinds of celloidin solutions are in common use:

Celloidin Solution (bichloride 1:16,000).

Ether (Squibb's),
Absolute alcohol, āā. 200 cc.

Of a solution of bichloride of mercury (grm. 1 dissolved in absolute alcohol 40 cc.), 1 cc.

Mix, and add of Anthony's "snowy cotton" sufficient to make the consistency that of simple syrup.

This solution is used chiefly for sealing wounds.

For iodoformized celloidin, 25 grammes of iodoform

powder are substituted for the bichloride; the powder and alcohol are first mixed together, the ether is then added, and finally the cotton.

Linen.—The operating-room linen list calls for sheets, small pillow-cases, towels for general purposes, small crash towels for the ether cone, cotton half-sheets, blankets and rubber sheets. A certain number of towels should always be kept in a 1:1000 solution of bichloride of mercury. Sterilized half-sheets can be used for spreading over the rubber which protects the blanket covering the patient; for this purpose they are much more convenient than a number of towels. The nurse should also see that the white cotton suits worn by the surgeon are kept in repair, and that clean ones are ready on each operating day. Her own dress should be of the same material, made with plain waist, skirt and belt, the sleeves being cut off just below the elbow. All these articles must be sterilized.

Methods and details differ somewhat; every surgeon has his own preferences, and the nurse must of course carry out his directions. Those given here have been thoroughly tested and may be followed when no others are ordered.

Every large general hospital has at least two operating-rooms— one for general surgery, and another for gynæcological operations, each main operating-room having a second, smaller room in which septic cases can be dealt with. In the gynæcological operating-room there should be an abundance of perineal and abdominal bandages, packing and tempons. Long stockings made of canton flannel are needed to put on the patient during minor operations. For abdominal operations, the half sheet should be made with an

opening down the middle, long and wide enough to allow of a full exposure of the field of operation. Sometimes squares of sterilized gauze slit in the center are used for this purpose and thrown away after one operation, but the sheet can be washed, and is therefore more economical; moreover, it stays better in place, and as it covers a larger area, fewer towels will be required.

As an abdominal section may be performed in either operating-room, we shall take this procedure as affording a good example of the steps to be taken in preparing for an operation.

The preparations should be begun in good time so that everything may be in readiness at the hour appointed. The temperature of the room must be regulated, so that it will be 80° F. at the time of the operation. On the table should be placed a felt pad or a folded blanket sufficiently large to cover it; next to the pad comes a rubber sheet, and over this is spread a white sterilized sheet. In some operating-rooms electricity is used to warm the top of the operating-table. A small air-pillow or one stuffed with hair is put where the head of the patient will rest.

The operating-room dress having first been put on, and the hands and arms having been vigorously scrubbed with soap and hot water, the regular preparations are begun. The instruments, ligatures, and dressings are put in the sterilizer; the various basins for the solutions and instruments are conveniently arranged on extra tables round the operating-table; the salt solution is heated in its flask over a Bunsen burner. After this the hands and arms are again prepared, so that the nurse may be ready to sponge a wound or

assist the surgeon in other ways in his manipulations. Finally a fresh sterile gown and rubber gloves are put on. In the preparation of the hands and forearms, they are scrubbed for ten minutes with warm water and borax soap or green soap, particular attention being paid to the finger-nails; they are then immersed in a saturated solution of permanganate of potassium for one minute, decolorized by being soaked in a saturated solution of oxalic acid, rinsed off in distilled water and finally immersed in a solution of 1:1000 bichloride of mercury for five minutes. After this constant vigilance should be exercised that nothing whatever is touched that is not sterile; the assistant nurse or the orderly must be called upon to do any carrying or lifting.

Just before the operation, the instruments are lifted from the sterilizer into basins containing the solutions. After the patient has been arranged on the table, properly protected with blankets and rubber sheets, only the parts to be operated upon being exposed, the articles for final preparation are handed to the surgeon by the assistant nurse. These consist of a basin of warm water, green soap, and hand scrubbing-brush. After the field of operation has been treated with these, ether or 95% alcohol is poured over it, and finally an abundance of a 1:1000 bichloride solution. Plenty of dry sterilized towels must be at hand; as those in the proximity of the wound become soiled, they must be replaced by others which have been previously sterilized, and placed in basins containing warm solutions.

After the operation is finished and the dressings are in place, the patient should be wiped dry with a warm

towel and then wrapped in hot blankets which should be closely tucked in about the neck, the sides of the body, and the feet. She should be taken quickly to an adjacent warm room where a bed has been especially prepared for her.

To Prepare for an Operation in a Private House.

In view of the greater risk to the patient's life, now-a-days only in emergencies are major operations performed in private houses. In such cases not a few difficulties may be met with in carrying out antiseptic preparations, but the majority of these can be readily overcome by the exercise of a little common sense and ingenuity. A nurse should have at least a few hours' notice, so that she may have sufficient time to make preparations. She should select the room, unless the surgeon has not already done so, with a view to securing proper light for the operation: It must be convenient to the patient's bed-room, and an open fire-place is very desirable. Carpets, hangings, and all unnecessary furniture should be removed; the walls should be brushed down, and the floor washed. If the carpet can not be removed sheets may be tacked over it. If household vessels be depended upon, all pitchers, basins, and towels should be boiled for an hour in a 2 per cent. solution of carbonate of soda or a 1:40 carbolic-acid solution. The table is usually the pine one from the kitchen, and must be scrubbed off with green soap and hot water. Two or three smaller tables covered with sterilized towels are needed for the basins. These, together with two or three plain chairs, are all the furniture necessary. There should be plenty of hot and cold water, soap and towels. The cold water

must first have been boiled and then kept in thoroughly clean vessels. There should be plenty of jars or pails to receive the water that has been used. The surgeon usually brings his own dressings and instruments, and other details should be carried out according to his directions.

CHAPTER XXII.

Gynæcology.—General and Special Preparation of Patients for Examinations and Operations.—Positions.—Instruments and Dressings.—Care After an Abdominal Section, and Minor Operations.—Gynæcological Terms and Definitions.

Now-a-days the treatment of gynæcological patients is so largely made up of operative procedures, that the preparation of such patients for operation and the after care of them by the nurse require some especial teaching over and above what she has had on the subject of general surgery. The anatomy of the pelvic organs, their functions and relations to each other, should be well understood by a nurse, in order that she may have an intelligent comprehension of the features peculiar to this work. She must be able to recognize the importance of any physical change that may take place in her patients, whether before or after operation, and must be familiar with the instruments and nomenclature used in this department of surgery. Education in this branch of nursing can hardly fail to impress a woman with the importance of using her influence among other women to bring about a broader knowledge of their physical construction, so that they may have a better appreciation of the general laws of hygiene, and more especially of those applying to the pelvic organs.

Treatment of gynæcological cases may be general,

local, or both general and local, but in the majority of hospital cases some operative measure in addition is generally indicated. The general treatment consists in putting the patient to bed and keeping her perfectly quiet, both mentally and physically. Any peculiarities in temperament or behavior should be noted and reported, as even a slight mental disturbance may be so aggravated by fear or shock that an acute maniacal or melancholic condition might follow an operation, and when in possession of all the facts connected with the case the surgeon will be able to judge whether operative treatment is advisable.

The nurse's duties before an operation are to surround her patient with a quiet, cheerful atmosphere, to keep from her any causes for excitement, and build up her system by special attention to the diet, giving milk in abundance and plenty of simple nourishment in an attractive form. Such a patient should have plenty of fresh air and sleep; all arrangements for the night should be finished by 9:30 P. M., the lights turned low, and the patient left undisturbed, when, as a rule, she will quickly go to sleep. If she awake during the night, a glass of hot milk, cocoa, or broth should be given. Frequently with this form of treatment are combined some local measures, such as the making of applications by the surgeon. When this must be done, the nurse should know just what is necessary to have on hand, and she must avoid any awkward delay, which may be very trying to the patient, especially if it be her first experience of the kind. It will also fall to the lot of the nurse to make proper preparations for the examination of the patient and assist

the surgeon, all of which should be done in a quiet, dignified and thoroughly professional manner. The nurse's deportment will go far toward reassuring the patient and helping her to restrain any signs of nervousness that she might otherwise be inclined to show, and which would prevent the surgeon from proceeding with his work. The nurse should always be present during the doctor's professional visits unless there should be any special reason to the contrary.

Before either an examination or application it is the nurse's duty to see that her patient is in a presentable condition. She should take care that the rectum is empty and should give a general sponge-bath or tub-bath and, if ordered, a vaginal douche. For this last a 1 per cent. solution of carbolic acid is usually employed. A fresh night-gown, stockings, and a wrapper are to be put on unless the examination or application is to be made in bed, when the wrapper is not necessary. For a digital examination all that is required, if the patient is in bed, is to have her moved over to the side of the bed which the surgeon prefers, where she is made to lie on her back with the knees drawn up. The covering should not be too heavy; a sheet is enough. A chair is placed at the bedside for the doctor, and a towel and some vaseline must be ready. A basin, containing water, should be placed on the wash-stand, and a nail-brush and soap. Examinations under ether are usually made in the operating room; the preparations are the same as those just described.

For applications the patient is to assume the most convenient position.

The several positions necessary to know are the left lateral, the dorsal, the knee-chest, and the upright posi-

tion. In the first, usually called the *Sims position,* the patient lies on her left side and chest, with the left arm drawn behind her and her head and right arm toward the right corner of the table, the buttocks resting well over toward the left lower corner; the legs should be flexed and the right knee drawn up above the left. This is the position usually ordered for applications requiring the use of the speculum, as the uterus and anterior wall of the vagina are well forward and a better view is obtained.

Vaginal examinations are made under cover and the dorsal position is the one generally adopted for these and for operations, whether capital or minor. The patient lies flat on her back, with the knees flexed; or the legs are otherwise arranged according to the nature of the operation.

In the *knee-chest position* the patient lies upon the side of her face, with her arms outstretched and her hands grasping the upper end of the table. The chest is flat on the table, the hips are elevated, the back being bent in opposite the lumbar region, and the weight of the body resting chiefly on the knees. This position is usually chosen for replacing a retroflexed uterus and for making applications to the uterine cavity or to the vault of the vagina. The Sims speculum is the one generally used.

For the *upright position,* the clothes of the patient are adjusted by folding the skirts about the waist, then wrapping a sheet about the waist and lower extremities, allowing an opening at the side. The patient stands with the right foot resting on the rung of a chair or on a low stool. In this position pessaries are sometimes inserted and examinations made.

Sheets or blankets, in addition to the patient's own clothing, are generally used as coverings, and should be arranged so that the patient is quite covered until everything is ready, when only the part to be operated upon should be exposed. For vaginal operations two or three thicknesses of gauze of sufficient size to extend from above the pubes to below the perineum may be wrung out of a disinfectant solution and spread over the parts: the operator works through a slit in the gauze, the opening being made sufficiently large so as not to interfere with his manipulations. Although this plan has not yet been generally adopted, the idea seems to be a good one. Long canton-flannel stockings reaching to the thighs should be worn under the sheets that are used to throw over the legs. For examinations under anæsthesia it is necessary also to have plenty of towels, a good supply of hot water, ether or chloroform with inhaler, basins, specula, uterine dressing-forceps, cotton, and disinfectant solutions.

Frequently the nurse is required to hold the Sims speculum: she should stand on the left side of the patient, allow the left arm to rest lightly on the patient's hip, and with the hand separate the buttocks near the vaginal opening; with the right hand she grasps the speculum, holding it steadily and firmly as directed by the operator. The speculum should be placed in some warm solution or in vaseline before being introduced.

The local dressings generally in use consist of packings of gauze and tampons of various kinds. The gauze is cut into strips about sixteen inches long and two inches wide. The plain sterilized gauze may be all

that is needed for this purpose; at times iodoformized gauze or gauze prepared with certain other chemicals may be desirable. Such packings are usually left in for from twenty-four to thirty-six hours, and are then removed with forceps, care being taken to make sure that every piece has been taken away by ending the procedure with a digital examination, as any gauze left in is liable to become foul and cause irritation.

Tampons are made of absorbent cotton or of lamb's wool. The cotton is cut into strips about eight inches long, four inches wide, and half an inch thick: each strip is then doubled, the ends are rounded off with the scissors, and the whole is tied securely in the middle, where it is folded, with a piece of stout linen thread, lengths of about six inches being left, with the ends knotted together, by which the tampon may be removed. Tampons are used as supports to take the place of pessaries, and for applying local antiseptics, powders and soothing drugs in inflammatory conditions. When the walls of the vagina are to be kept apart lamb's-wool tampons are used, as they are nonabsorbent and do not become sodden. They are made by twisting around three fingers a piece of wool 30 cm. long and 3 cm. wide, so as to form a loop; a piece of linen thread is tied around the center of the loop, leaving long ends to the threads as described. The wool is then spread out flat. When a tampon is to be placed in the vagina the posterior surface of the small blade of a Sims speculum is anointed with sterilized vaseline, and the speculum is carefully introduced. Gentle traction being made upon the posterior vaginal wall by means of the speculum, the tampon can then

be introduced with a pair of long dressing-forceps into the anterior or posterior cul-de-sac of the vagina. Usually an order is given to remove a tampon after twelve to twenty-four hours, and to follow its removal with a warm douche.

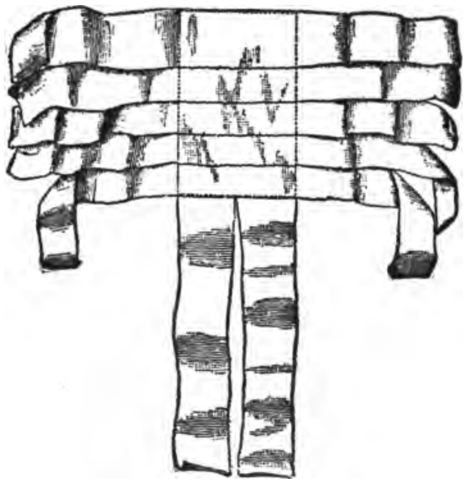
If a Hodge pessary, or one of a similar type, is to be removed, two fingers of the left hand are introduced into the vagina, and the index finger, being hooked over the anterior bar of the pessary, which rests against the upper portion of the symphysis pubis, gives it a half turn: this frees it from the cervix, and it only remains to remove it from the vagina. The pessary should be placed, after removal, in a 1 : 40 carbolic-acid solution for five minutes, then well washed off and dried.

For making the general dressings in a gynæcological ward, the necessary instruments to have ready are a Sims speculum, uterine and ordinary dressing-forceps, a uterine sound, probe, tenacula, curettes both sharp and dull, bullet forceps, applicators, cotton-holders, and a pair of straight scissors. These should be sterilized ready for use, and in addition there should be a dressing-basket or carriage containing a roll of sterilized gauze and absorbent cotton, vaseline, tampons, pessaries and the standard solutions and ointments, also the various disinfectant powders, such as iodoform, boric acid, and astringents. Rubber strapping wound in strips on glass rods, perineal and several modified Scultetus bandages (Fig. 10), should be ready to hand, and plenty of basins, hot solutions and towels are among the things required.

For minor operations the preparation of the patient,

with a few modifications, is practically the same as for an abdominal section. Twelve hours before the operation, the physician usually orders a tub-bath or a sponge-bath and the administration of a cathartic; on the next morning the patient must take no breakfast: she should receive a simple soapsuds enema, which should be repeated until effectual. The parts must

Fig. 10.



Modified Scultetus Bandage

then be shaved; it may be necessary to go over the surface with the razor two or three times, in order that the finest hairs may be removed. When this has been done, the parts must be thoroughly scrubbed with green soap and water, washed off with alcohol and afterward with ether, and finally sponged with a 1:5000 bichloride solution. A compress of sterilized gauze

wrung out of warm bichloride (1 : 5000) is next put on, and held in place with a sterilized abdominal binder to which are attached perineal straps, to keep it from sliding out of place.

The After-care of an Abdominal Section Case.

In the care of a patient after an abdominal section, before the patient is removed from the table some operators order an enema consisting of a litre of warm sterile normal salt solution given with the patient in the Trendelenburg position. The good effects resulting from this procedure are manifold; it tends to relieve the thirst which follows abdominal operations; it stimulates the kidneys and thus increases the secretion of urine while at the same time it lessens the irritation of the bladder and prevents retention; it also has a general systemic effect. Sometimes one-thirtieth of a grain of strychnin sulphate, twenty-four grains of ammonium carbonate and half an ounce of brandy are added to the salt solution. For the first twenty-four hours, very little can be done except keeping the patient quiet, watching the pulse, looking out for hæmorrhage, and allaying the excessive thirst, as much as possible, by rinsing out the mouth with hot soda-water or plain water and moistening the lips from time to time. As a rule, the patient is not allowed to drink water, as it induces and prolongs nausea, which would defeat our main object, which is to keep her in every way as quiet as possible. Even ice should not be given as it only increases the thirst and nausea. If the thirst persists, a high enema consisting of a pint (500 cc.) of normal salt solution may be administered slowly, and repeated if necessary. Nourishment by the

mouth may not be ordered until after twenty-four or thirty-six hours, and then probably only in very gradually increasing quantities. Small quantities of albumen water—two teaspoonfuls every two hours—are generally well borne, or a little milk and lime-water may be tried. Half an ounce of champagne with cracked ice is sometimes very grateful. Stimulants should be kept near at hand, and if the patient is in an exhausted condition, a nutritive enema may be ordered at once, so that the necessary articles for giving one should be ready for use at a moment's notice. Unless the patient voids urine within eight hours after the operation, the retention should be reported and a catheter prepared. If urine is voided, the quantity should be carefully noted. The bowels will nearly always need attention by the morning of the second day, and it is important that the nurse should record and report accurately the result of the enema which is generally ordered. If there be no result after several repetitions, she should be particular to report the fact immediately, as failure on the part of the bowels to move may indicate an obstruction, and the surgeon may wish to institute further treatment at once. For the first week or ten days a neat and accurate record sheet should be kept by the nurse. The pulse and temperature are carefully watched and any changes are to be promptly reported. For uneasiness and pain in the back, small flat pillows and the knee-pad must be adjusted and changed whenever necessary. To ease distress caused by the continuous dorsal position, when twenty-four hours have passed after the operation, at intervals the patient may be carefully turned

on her side for a few minutes, the back being supported with pillows.

Unless otherwise specified by the doctor, the diet should consist of liquids until after the sixth day or until the stitches are removed, when soft food may gradually be added. At the end of twelve days or a fortnight a general diet is ordered. The patient is allowed to sit up in bed from the twelfth to the eighteenth day, and is able to go home at the end of the third or the fourth week. As a matter of comfort an abdominal bandage is fitted on her before she is allowed to get out of bed.

The After-care of a Case of Perineorrhaphy.

For the first twenty-four hours the treatment is practically the same as for cases of abdominal section, but soft food is generally ordered on the second day, and the bowels should move freely at least once daily; an enema should be given previous to the movement, to soften it and to prevent straining. When a patient is having a movement of the bowels, great care must be taken that the stitches are not torn apart, and if there be any straining whatever, the nurse should hold the parts together: this is a good plan to follow, at any rate for the first few days. Usually catheterization is ordered during the first forty-eight hours. Aseptic precautions must be carefully observed, the parts should be bathed before using the catheter, and the greatest care employed to prevent any drops of urine from falling upon the stitches; the wound should be washed off with a little sterilized cotton held with the forceps and dipped in a saturated solution of boric acid. It should then be wiped gently and quite dry with bits

of cotton held in the same way, and powdered boric acid or other powder, or the dry dressing ordered, reapplied. The hands should be scrubbed clean and disinfected before beginning the work. These precautions should be taken each time the urine is voided and after every movement of the bowels. Extra safety can be assured by the use of rubber gloves that have been soaking in a 1 : 1000 bichloride solution. Usually a little gauze packing is put just within the vagina at the time of the operation to absorb any oozing from the stitches, and this should be removed the next morning. A douche should never be given after a perineorrhaphy without an order from the surgeon, and the greatest care should be taken to see that no water is left lying against the stitches within the vagina, as is likely to happen unless one swabs it out and makes the surfaces quite dry, which may be done with the aid of forceps covered with cotton. After an operation upon the perinæum the patient should be kept in the recumbent position for the first ten hours. After this, if she is restless and complains of pain in the back or if she desires to change her position, she may be carefully turned on her side. A small soft pillow should be placed between the knees; a bandage around them will seldom be necessary.

Hæmorrhage is liable to occur after operations upon the cervix or after a perineorrhaphy, and the nurse should be able to control it until the doctor arrives. For bleeding from the cervix a hot alum douche is generally all that is necessary, but if this is not effectual, the vagina should be cleaned out with cotton applied by means of the forceps, and tightly packed with plain sterilized gauze or gauze medicated with some

such astringent as tannic acid in powder or solution. For hæmorrhage from the perineum, the parts may be elevated and pressure made with a pad of cotton or gauze against the bleeding surface.

Lavage of the bladder in gynæcological cases is usually ordered for a cystitis which may be either acute or chronic. Boric-acid solution is most frequently used. This is sometimes mixed with an equal quantity of salt solution. Three pints should be used; the urine is first drawn off and then a pint of the boric-acid solution allowed to run gently in; half the fluid is drawn off, the tube replaced, and the other pint, if necessary, is introduced. The third time this is done the water should be clear when emptied from the bladder. Another favorite solution for irrigating the bladder is Thomas' fluid, made as follows: Normal salt solution, 1 litre; borax, 15 grammes; glycerin, 20 cc.

Some patients cannot bear so great a distention of the bladder, and as soon as any complaint is made one should allow the fluid to escape. The vessel and catheter used must be surgically clean, and all precautions taken as in an ordinary catheterization.

As nurses are constantly hearing difficult and unfamiliar words used in connection with gynæcological work, and as it is important that they should in many cases understand something of the nature of the operation performed, a synopsis of gynæcological operations and the terms applied to them will be introduced here:

Metritis. From the Greek *metra,* uterus, the termination *itis,* signifying inflammation. Inflammation of the uterus. This condition may be due to any

inflammatory condition existing in the pelvis; more commonly it comes on as a consequence of post-partum infection (after labor), and is known as septic metritis.

Endometritis. From the Greek *endon* (or *endo*), meaning within, and *metritis,* inflammation of the uterus; inflammation of the lining membrane of the uterus. For this the operation of *curettement* or curetting is performed, which means the removal of the inflammatory products by means of a dull or sharp curette.

Stenosis of the Os Uteri or Cervical Canal. (*Stenosis,* a narrowing; *os,* mouth). A contraction or narrowing of the cervical canal. For this the operation of dilating is performed, which means the stretching or dilating of the cervical canal by the use of instruments called dilators, or of sponge tents.

Laceration of the Cervix Uteri. A tear of the neck of the womb. The tear may be unilateral—*i. e.,* confined to one side; bilateral—taking in both sides; or stellate—irregular or star-shaped. This condition is generally caused by childbearing. For this lesion the operation of trachelorrhaphy (from the Greek *trachelos,* neck, and *rhaphia,* a sewing) is performed, in which the torn lips of the womb are brought together by sutures. When this is done immediately following childbirth, it is called the "immediate operation;" when performed after the first week, it is called the "secondary operation."

Relaxed Vaginal Outlet. The relaxation of the tissues that form the entrance to the vagina. This is caused by over-distension of the parts during childbirth. The operation performed for this is known as perineorrhaphy (*perineum,* and *rhaphia,* a sewing or

suturing), and has for its object the bringing together of the relaxed tissues by dissecting away a portion of the mucous membrane of the vagina, and then uniting the denuded parts by sutures.

Laceration of the Perineum. A tearing of the tissues forming the perineum. There are several grades. When the laceration extends through the sphincter ani, it is known as a complete laceration; when it does not extend so deep, it is known as an incomplete or partial laceration. The operation performed for remedying this condition is also known as perineorrhaphy, and, as the name implies, means the bringing together of the parts by sutures. In cases of complete laceration special care must be used in giving enemata, for some time after the operation, to do it in such a way as to avoid disturbing those sutures which have been passed through the fibres of the sphincter ani.

Excision of a Bartholinian Cyst. The cutting out of a cyst formed by dilatation of the duct coming from one of the glands of Bartholini. The gland becomes swollen as the result of the accumulation of its secretions due to the closure of some portion of the duct.

Uterine and Cervical Polypi. These are tumors which occur in the mucous membrane, and are made up of the same kind of tissues as the membrane from which they grow. They are generally attached to some portion of the cervical canal or fundus of the uterus by a long pedicle or root. They are removed by being twisted off with forceps, by excision, or by ligature and excision, by means of the cautery (Paquelin's), or the *écraseur*.

Carcinoma of the Cervix Uteri. Cancer of the neck of the womb. Its most prominent symptom in the

majority of cases is hæmorrhage. The treatment of this condition is either palliative or radical. By *palliative* treatment is understood the removal of as much as possible of the cancerous mass by means of the finger and curette, and the destruction of the tissue, which it is impossible to remove by this procedure, with the thermocautery. By the *radical* treatment is meant the total extirpation of the cancerous tissues. This is performed either by amputating the diseased portion or by completely removing the cervix and uterus by performing a vaginal hysterectomy (from the Greek *hystera,* the uterus, and *ectomia,* cutting out).

Cystocele (from the Greek *cystis,* bladder, and *cele,* a tumor). A prolapse of the anterior vaginal wall, which brings down with it the bladder.

Colpocele. Gr. *colpos,* vagina, and *cele,* tumor. Descent of the vaginal wall. Every cystocele is a colpocele. The condition is frequently a consequence of labor. The operation performed for its relief is known as anterior colporrhaphy (*colpos,* vagina, and *rhaphia,* a suturing), which means the bringing together of the relaxed vaginal tissues by sutures.

Rectocele. A mixed word from the Latin *rectum* and the Greek *cele,* tumor. A prolapsus or relaxation of the posterior wall of the vagina, which brings with it the rectum. This occurs in most instances as a consequence of childbirth.

Amputation of the Cervix Uteri. The removal of the cervix. This is performed for prolapsus of the uterus; also, for hypertrophic elongation of the cervix, or for cancer of the cervix.

Pelvic and Abdominal Operations and Diseases.

Coeliotomy or Laparotomy (the latter from the Greek *lapara,* lit. the flank, and *tomia,* a cutting), and *Abdominal Section* are synonymous terms employed to describe the incision through the abdominal walls.

Cœliotomy is the proper scientific term, *coelia* being the Greek for the *abdomen,* and *tomia,* meaning "cutting."

Ovaritis. Ovarium, ovary, *itis,* inflammation of. Inflammation of the ovary.

Salpingitis. Salpinx, the tube, and *itis,* inflammation of. Inflammation of the Fallopian tube.

Salpingitis and Ovaritis. Inflammation of the Fallopian tube and ovary.

Abscess of the Ovary. A purulent collection (pus) in the ovary.

Pyosalpinx. Greek *pyon,* pus, *salpinx,* the Fallopian tube. A collection of pus in the Fallopian tube.

Hydrosalpinx. Hydrops, dropsy, *salpinx,* Fallopian tube. A collection of watery fluid in the Fallopian tube; dropsy of the Fallopian tube.

Haematosalpinx. Haema (gen. *haematos*), blood, *salpinx,* Fallopian tube. A collection of blood in the Fallopian tube (most frequently due to ectopic gestation).

Ovarian Cystoma. A cyst of the ovary.

Haematoma of the Ovary. A blood-tumor of the ovary.

Dermoid Cyst of the Ovary. A cystic tumor containing skin, teeth, hair, etc. Dermoid cysts are congenital tumors.

Ovariotomy. Ovarium, ovary, *tomia,* section. Removal of an ovary.

Oöphorectomy. Oöphorum, ovary, *ectomia,* excision. A better term to signify an operation for the removal of an ovary.

Salpingo-oöphorectomy. Salpinx, the Fallopian tube, *oöphorum,* ovary, *ectomia,* excision. Removal of the Fallopian tube and ovary (as for myoma of the uterus). When the tubes and ovaries on both sides are removed, the operation is called a double salpingo-oöphorectomy.

Myomectomy. Myoma, lit. a thing made of muscle, a muscular tumor; *ectomia,* excision. The removal of a myoma from the uterus. Such a growth is commonly spoken of as a fibroid tumor, but myoma is the more correct term.

Hysterectomy. Hystera, the uterus, *ectomia,* excision. The complete removal or extirpation of the uterus. This may be done either through the vagina (vaginal hysterectomy) or through an incision in the abdomen (abdominal hysterectomy). It is generally performed for carcinoma (cancer) of the cervix or uterus.

Hystero-myomectomy. The removal or extirpation of the uterus for myoma.

Hysterorrhaphy or *Supensio Uteri. Hystera,* the uterus, *rhaphia,* a suturing. The suspension of the uterus to the anterior abdominal wall by sutures.

Parovarian Cyst. A cyst developing from the parovarium of the broad ligament (between the ovary and Fallopian tube).

Ectopic Gestation. A pregnancy going on outside of the uterine cavity, generally in some portion of the

Fallopian tube, in which case it is called "tubal pregnancy." It may also occur in the ovary or even in the abdominal cavity.

Caesarean Section. The removal of the fœtus from the uterus by means of an incision through the abdominal and uterine walls of the mother. It is resorted to only when the pelvis is deformed, or when the fœtus is still living after the death of the mother.

CHAPTER XXIII.

THE ADMINISTRATION OF ANÆSTHETICS.

A nurse is often called upon in private practice to administer an anæsthetic, as it is not possible at every operation to have sufficient medical assistance. She can never feel herself competent to do this unless she has taken advantage of her opportunities in the hospital for watching and herself practising the administration, and for informing herself thoroughly of the principles and methods involved, of the dangers to be watched for, and of the proper way to guard against them. Every time she is present when a patient is being anæsthetized gives her another opportunity for following each step in the process, and when a fitting occasion for asking questions regarding any point presents itself, she should not neglect it.

Anæsthesia means a condition in which there is an absence of sensation. The agents used to produce this condition are called anæsthetics, and may be either local or general in their effects. The general effect is produced by inhaling the anæsthetic in the form of a vapor or gas into the lungs, whence it is carried by the blood to the nerve-centres, upon which it acts.

Local anæsthesia is produced either by the injection of the proper agents in liquid form into the subcutaneous tissues or by applying them externally.

Anæsthetics are largely employed in surgery, their principal uses being to do away with pain during opera-

tions and to produce insensibility and a relaxed condition of the muscles when a thorough examination is necessary. In obstetrics the inhalation of chloroform or ether is a great boon, and in medical treatment anæsthetics are sometimes given to control convulsions. The general effect of an anæsthetic may be either partial or complete. The two substances most frequently used for inhalation are ether and chloroform. In dentistry nitrous oxide or laughing gas is used, as its effects pass off rapidly and the patient need not be put in the recumbent posture. For use as an anæsthetic it is liquified by pressure and stored in iron cylinders from which, at the room temperature, it is liberated as a gas. Now-a-days preliminary inhalations of nitrous oxide are often given in order that the unpleasant first and second stages associated with ether and chloroform narcosis may be avoided and in this way the nervous strain upon the patient may be lessened. Profound anæsthesia is produced usually in from three to four minutes; a smaller amount of the other anæsthetic is required to keep up the effect, and the vomiting during and after narcosis is apt to be less troublesome.

To Prepare a Patient for Anaesthesia.—No solid food should be allowed for six hours previous to the administration of an anæsthetic, but a little water or a cup of beef-tea may be taken three hours before. If an anæsthetic is given very soon after a hearty meal, vomiting almost invariably follows, and may delay the operation; moreover, there is danger of solid portions of food being drawn into the trachea and producing suffocation; or the throat and pharynx may become

filled up and the resulting obstruction prove very dangerous.

If the patient be very weak and delicate, the physician may order a hypodermic injection of strychnin, or atrophin with morphin, depending upon the patient's condition, before the administration of the anæsthetic.

The forenoon is the best time to select for giving an anæsthetic, as the vital powers are in better condition, if the patient has had a good night and is not exhausted by nervous excitement or pain. The clothing should be light and warm, but loose about the neck and chest, and no corset or tight waist should be permitted because the respiratory organs must have freedom of movement. The urine should be voided or the catheter passed. If there are false teeth, they should be removed. If the patient be a child, care should be taken to see that the mouth is quite empty, as there may be coins, buttons, or other articles stowed away therein. The patient is placed in a recumbent position, with the head low or resting on a small air-pillow, and should be covered with warm blankets, the hands being left free, so that the pulse may be easily reached; a towel is to be laid across the chest under the chin. An extra towel and basin should be ready. The nurse must also have at hand a hypodermic syringe (sterilized and in good order), whiskey or brandy, tincture of digitalis, a solution of strychnin, morphin, atropin, and aqua ammonia, as any of them may be called for. There should be, besides, a liberal supply of chloroform and ether, towels, inhalers, tongue forceps, wooden wedges or gags, and vaseline; the last is applied about the lips and nose to prevent irritation from the vapor. The pulse should be taken before starting.

The anæsthetic may be given to the patient either in bed, after which she will have to be carried to the operating-room, or in a room near the latter where there will be nothing suggestive of the operation. The room should be quiet, and no talking is to be done beyond what is absolutely necessary, and that in a low tone; otherwise it takes longer to get the patient under the influence of the anæsthetic. Besides the anæsthetizer, if the patient is a woman, the nurse should always be present to give any necessary assistance, but a second or even a third person may be needed if there be much struggling. Ether is probably given in this country oftener than any other anæsthetic, as there seems to be little danger to life under ordinary circumstances when it is carefully administered. The contraindications to the use of ether are chronic diseases of the bronchi and of the kidneys. Speaking generally, chloroform is preferable for very young or very old patients.

If lights are used near the ether, they should be kept above the neighborhood of the can or inhaler, as ether vapor is heavier than air and very inflammable.

There are various styles of ether-inhalers, but one that is easily made and can always be had fresh and clean is the so-called "ether cone." It is prepared by folding one or two layers of paper or blotting paper — newspaper answers the purpose — together to make a thin pad about 16 inches long and 9 wide; this is covered with oiled muslin and over all is stitched a small, loosely-made crash towel or a piece of linen large enough to cover it entirely; the whole is then twisted into the shape of a cone and held in place with pins, a small opening being left at the top. A small sea-

sponge or some absorbent cotton is put inside upon which to pour the ether.

About half an ounce of ether is poured upon the sponge at first, and the cone held at a short distance from the patient's face, or for a few moments he may be permitted to hold it himself if inclined to be nervous or to think that he is going to be suffocated. After these first few moments, however, when the feeling of irritation has passed, the cone should be gradually held more closely over the mouth and nose, very small quantities of ether being added frequently. The first stage is the most disagreeable, owing to the irritation produced on the mucous membrane of the mouth, throat, and bronchi, which may give rise to coughing and a sensation of suffocation. When the patient struggles, talks, or cries out, the pulse and respiration are quickened and the face flushes. The ether is kept up steadily, a few drachms being added from time to time, until finally the patient quiets down, the muscles become relaxed, and sensation is lost; this stage is called that of primary anæsthesia. This, however, is only transient, and may in its turn be followed by struggling and excitement, after which there ensues a condition of complete anæsthesia in which there is absolute relaxation of the muscular system, the conjunctival reflex is abolished, the face and skin are moist, and the patient lies as if in a deep sleep. The pulse is full and quickened and the respirations are slow and regular; these, as well as the reflexes, should be watched constantly. The reflex to light should remain active; that is, when the eyelid is opened the pupil should contract. A rapidly-dilating pupil is a sign of imminent danger. The time required to pro-

duce complete anæsthesia differs with different individuals, and may vary from five to twenty minutes. It is also modified by sex and age, women and children being influenced more readily than men. Patients who have been alcohol *habitués* usually struggle violently; during the struggling the anæsthetic must be pushed, but great care must be taken when the struggling begins to cease, as the patient then passes with great rapidity into the stage of complete anæsthesia.

In the early stages of the administration of ether the patient may suddenly stop breathing and the face become cyanosed; the cone should be at once removed, and pressure made upon the chest and sides once or twice, when the breathing will recommence. After the patient is ready for operation, the etherizer continues to keep a constant watch upon the pulse, respiration, reflexes, and general condition, and a few drops of ether in the cone from time to time will suffice to maintain the unconsciousness. To prevent the tongue from falling back into the throat and thus obstructing the air passages, the lower jaw should be pushed forward and upward. It may be held in this position by two or three fingers placed behind the angle of the jaw, while the others keep the cone in place. Any accumulation of mucus in the mouth should from time to time be wiped out with a towel, and the patient's head should be turned to one side to allow as much as possible to escape in this way. If we are warned by contractions of the abdominal muscles (retching) that vomiting is threatening it may be averted by pushing the ether; if the patient vomits, the head is to be quickly turned to one side, and the mouth cleaned out before an inspiration can be taken,

otherwise some of the solid particles vomited may be drawn into the larynx. If the breathing ceases, the head and chest should be lowered to send more blood to the brain, and artificial respiration should be begun at once and maintained until breathing is reestablished; aqua ammonia may be held at a little distance from the nostrils. The pulse may be conveniently counted in the temporal or in the facial artery and if it grows weak and fluttering, the attention of the surgeon should be at once called to the condition. Ether is very irritating to the kidneys, and the amount of urine should be accurately measured for some days before and after the administration.

A patient should be watched until consciousness is restored, which usually takes place within half an hour or an hour: with some the effects are slept off, while others may be very excitable and hysterical. Nausea and vomiting frequently follow ether narcosis, and basins and towels should be kept at hand, so that the clothing may be protected. The head must be kept low, no pillow being used. If the vomiting is persistent, frequent drinks of water only aggravate it; Seltzer water in sips or a little cracked ice is better. The extreme thirst may be somewhat relieved by hot tea or hot water, a teaspoonful at a time. If there be pain from accumulation of gas, a drop of the tincture of capsicum in a little hot water will often give relief. For headache an ice-cap or ice-cloths may be applied and the patient kept quiet; no visitors should be allowed.

Chloroform ranks next to ether as a systemic anæsthetic. It has some advantages over ether, as it is more pleasant to take, its vapor is not so irritating to

the mucous membranes of the mouth and throat, and its action is much more rapid, while its after effects are less disagreeable. On the other hand the danger to life where the administrator has not had a wide experience is much greater than with ether, as it acts at once upon the respiration and depresses the heart. Children and old people bear it better than the middle-aged. To prepare a patient to inhale chloroform the same points are observed as with ether: anointing the lips and nose with vaseline or ointment is here even more essential, as chloroform vapor is very irritating, and if applied to the skin for any length of time may produce vesication.

Chloroform-inhalers are of many kinds: the small wire frame covered with flannel is perhaps among the simplest and best, but in the absence of any special apparatus a towel or napkin may be used. Half a drachm of chloroform is poured upon the towel, which at first is held some little distance from the face, and gradually brought nearer until it is within two or three inches of the nose and mouth; this allows for free dilution with air—an absolute necessity. The patient should be induced to breathe quietly and gently, in order to avoid any irritation or sense of suffocation; the time required to produce insensibility is about five minutes, and when this is complete there will be no contraction of the eyelids when the conjunctiva is touched. The pulse, respiration, pupil, and color of the face should be constantly watched, as, while the patient is in apparently good condition, the breathing or the pulse may suddenly cease and the face take on a livid hue or become ghastly pale. These are indications of danger, as death may quickly follow from

paralysis of the heart and respiration. Artificial respiration is at once resorted to if the respiration ceases. If it be the pulse that stops, no time must be lost, and the patient must be partially suspended with the head lowered, and artificial respiration at once instituted. A nurse will probably seldom, if ever, be entrusted with the administration of chloroform.

Chloroform is used almost exclusively instead of ether with obstetrical patients; it is administered generally during labor in the second stage when the pain is very severe or when forceps are applied.

The agents used as *local anaesthetics* are the hydrochlorate of cocain, ethyl chloride, carbolic acid, alcohol, and ice.

Cocain is a powerful local anæsthetic; it is used in solution in strengths from 1 to 20 per cent. For the surface of mucous membranes a piece of cotton saturated with the solution is applied to the area for a few minutes until insensibility is produced. It is also largely used hypodermically, sometimes being injected into the nerve trunk supplying the part. Before injections are given the skin and syringe should be antiseptically prepared. Cocain is particularly valuable in operations upon the eye, ear, throat, and nose, as well as in making examinations of these organs; it should never be used, however, except by a physician's order, as individual susceptibility to the toxic influence of the drug is sometimes marked, and death has more than once been caused even by weak solutions. Some surgeons prefer using a weak solution of cocain combined with carbolic acid; so it is well to have both drugs in readiness.

To produce insensibility of a part by means of car-

bolic acid, the pure acid (liquefied) is painted over the skin; it at first causes some pain, which, however, is followed by numbness, when an incision may be made without its being felt. Owing to its caustic action upon the tissues, the drug is rarely employed for this purpose.

If a vessel containing alcohol is placed in a larger one which has been filled with ice and salt, the alcohol is rendered very cold. If now the part (a finger or hand) is placed in it or compresses kept very cold with the alcohol are applied to the surface sensation soon becomes benumbed. Ice and salt held in contact with the tissues into which the incision is to be made will also render them less sensitive to pain.

A spray of ethyl chloride or ether directed upon the surface for a few seconds will also bring about a condition of local anæsthesia.

CHAPTER XXIV.

INFECTIOUS DISEASES.—FEVER.—TYPHOID FEVER.—MALARIAL FEVER.—SCARLET FEVER.—DYSENTERY.—ASIATIC CHOLERA.—SMALL-POX.—DIPHTHERIA.—PULMONARY TUBERCULOSIS.

Fever is present in almost all acute infections; it is not a disease in itself, but a symptom. The progress of a disease may oftentimes be estimated and indications for treatment may often be obtained by watching the course of the fever. For several of the infectious diseases the specific causative germs have been demonstrated, while in the case of others, although these also are supposedly referable to a germ origin, positive proof is still lacking. There are certain constitutional symptoms that are generally found in any condition of fever. Besides the increase of the body heat and the pulse rate, headache and backache, varying in kind and degree, chilly sensations or severe rigors, great thirst, dryness of the mouth, tongue and throat, loss of appetite, impaired digestion and sleeplessness, are often met with. In all fevers, as a rule, there are three more or less well marked stages (1) that of invasion—while the temperature increases; (2) the stage of acme when the disease reaches its height; (3) the stage of decline or defervescence. In all febrile diseases there is waste of the body-tissues, and this is usually proportionate to the height and duration of the fever. In caring for fever cases one should arrange for absolute rest of mind and body; any exertion

produces not only an elevation of the temperature, but also an increase in the pulse-rate, and thus adds unnecessarily to the tissue-waste, while at the same time it increases the strain upon the heart. The patient should be made as comfortable as possible; there should be a constant supply of fresh air; the bed must be carefully looked after, and always kept fresh; all heavy clothing should be avoided; a night-gown which opens all the way in the front for the patient, and a sheet and a light blanket for the bed, will usually afford sufficient covering. If regular sponge-baths are not ordered to reduce the temperature, in any case a sponge-bath should be given every morning, and repeated at night if possible; if the patient is so sick that nothing more can be done, the face, hands, and back at least should be sponged. Frequent cleansing of the mouth is desirable, not only for comfort, but also to inhibit bacterial growth in it, and thus lessen the chances of a complicating inflammation of the parotid gland or middle ear, or a bronchopneumonia. The bodily strength should be kept up by the regular administration of nutritious food, given in liquid form, milk, as a rule, being the best. For the reduction of temperature medicinal agents or applications of cold water will probably be ordered; the latter method is the one most extensively used at present, the majority of physicians believing that antipyretic drugs produce too much prostration if continued through a long illness. When fever first appears it is always safer to isolate the patient until the nature of the disease has become manifest and thus avoid any risk of infecting others.

These general directions apply to the management of fever when present in any disease. We shall now speak briefly of the infectious diseases, by which we mean those resulting from an invasion of the body by micro-organisms. These may or may not be directly contagious. It is important that a nurse who has charge of several patients should be constantly on her guard against conveying infection from one to another. The strictest cleanliness in regard to vessels, hands and general surroundings is essential.

Typhoid fever is an acute infectious disease, caused by a microorganism (Eberth's bacillus). It is characterized by a fever running a definite course, with local inflammation and ulceration in the small intestines, particularly of the patches of Peyer. These *Peyer's patches* are scattered throughout the mucous coat of the small intestines, being most numerous in the ileum; the inflammation and ulceration may also extend into the colon, in which case the solitary follicles are chiefly involved. Typhoid is most prevalent in the late summer and autumn months. The majority of cases occur in individuals over fifteen and under forty years of age. The period of incubation lasts from one to two weeks, but wide variations are met with; the duration of the fever in moderate cases is about three weeks, convalescence beginning in the fourth week; in protracted cases, however, convalescence may be delayed until the seventh week.

The prodromal symptoms are—constant headache night and day, aching of the limbs, and a dull tired feeling, with chilly sensations, loss of appetite, and perhaps nose-bleed. There is usually a gradual and progressive rise of temperature, with morning and

evening variations, the evening temperature being higher on each successive day by a degree or a degree and a half, generally reaching 103° or 104° F. by the eighth day, where it remains with but slight variations during the second week. There is also but little difference between the night and morning temperature during this time, but in the third week there is a distinct fall in the morning and a gradual decline in the evening temperature. The pulse-rate increases proportionately with the temperature, going to 100 or 110 or even higher. The headache usually ceases about the tenth day. A bronchitis with a troublesome cough may be present from the beginning and continue throughout the attack. The rash appears from the seventh to the twelfth day in the shape of rose-colored spots seen on the abdomen and thighs, and sometimes on the back, which disappear on pressure and return when it is removed, each spot lasting about three days. They often appear in successive crops. The tongue at first is coated and white, but afterwards may be very dry, dark, and cracked if the sordes that accumulate rapidly are allowed to dry upon it. The lips may be in the same condition and become very sore. By "sordes" we mean the dark-brown accumulations which remain in the mouth, being a mixture of food, epithelium, and micro-organisms. They collect thickly on the tongue, teeth, and lips, but such collections can be prevented to a great extent by frequent washing out of the mouth with antiseptic cleansing lotions and by giving the patient plenty of water to drink, especially after he has taken milk or other food. The mouth is most easily washed

out with small squares of gauze or soft muslin, which after use are to be at once burned.

Constipation or diarrhoea may be present at first, the latter being more frequent, but an average of three or four stools a day during the second week is not uncommon. These stools have a yellowish, pea-soup appearance. Their character should always be carefully noted and if there be anything unusual about them, they should be kept for the physician's inspection; if there be constipation, the bowels should be opened daily by an enema, which should not, however, be given without the order of the physician. The care of the excreta has been described elsewhere. The characteristic odor of typhoid discharges is prone to cling about the patient unless scrupulous cleanliness in regard to the body and linen is observed. Its presence is always a sign of careless nursing. The urine is diminished in quantity at first, and retention should be watched for; later the flow is more abundant.

Haemorrhage from the bowels may occur at any time after the second week. The first indication is usually a sudden fall of temperature with symptoms of collapse, or the blood may appear suddenly in the stools. The patient should be kept perfectly quiet on his back, the foot of the bedstead should be elevated, and an ice-bag applied to the abdomen. Ice may be given by mouth but for some hours little if any nourishment; the bed-pan should be adjusted with the least possible disturbance to the patient. A sudden drop in temperature from high fever to or even below the normal should be at once reported, as it may indicate either hæmorrhage or perforation. The hæmorrhage comes

from the sloughing through of the walls of a vessel at the base of an ulcer.

Perforation of the intestine is one of the greatest dangers in the course of typhoid fever. The wall of the intestine gives way, and through the hole, which is often very small, the contents escape into the peritoneal cavity, giving rise to a peritonitis which generally ends fatally. The symptoms are those of collapse, accompanied by severe pain, with a sudden fall of temperature, a small rapid pulse, and distension of the abdomen. The knees are usually drawn up and the patient looks desperately ill. In such instances, however, prompt surgical interference has often saved life.

Tympanites.—Distension of the abdomen from gas in the intestines is frequently present, but is not considered a serious symptom unless it is persistent and marked. If turpentine stupes are ordered, care should be taken to have them well applied. Turpentine enemata are sometimes given for the same condition.

A relapse may occur once, sometimes indeed even two or three times, after convalescence has apparently begun. Then too, besides a genuine relapse, there are frequently marked elevations of temperature, lasting a few hours or days, due to errors in diet, over-exertion, or excitement. The nurse must be careful about these, and also avoid anything which might put too sudden a strain on the enfeebled heart, as sometimes death results from heart paralysis.

For *insomnia* or other nervous symptoms the ice-cap may be ordered or iced cloths be applied to the head. Sometimes sponging will allay the restlessness. A delirious patient inclined to get out of bed should

be watched constantly and never left alone. Many lives have been lost because the nurse has thought that she could safely leave a patient for a few moments. Any delusions must be met with tact and a true appreciation of the patient's condition. A certain amount of risk is always encountered by the nurse in cases of delirium, as a violent attack may be made without a moment's warning. Among the symptoms which are considered unfavorable are marked muscular twitchings, excessive tympanites, prolonged high temperature, and a rapid fall of temperature. A gradual fall of temperature, while the tongue becomes moist and clear about the edges, with return of appetite, is a symptom of approaching convalescence.

The treatment, besides the measures employed for the reduction of the temperature, consists chiefly in good nursing. The temperature is reduced by the application of cold water, by means of the tub-bath, spongings, or the cold pack, all of which procedures have been already described in the chapter on "Baths." The bath is usually ordered if the temperature rises above 102.5° F.

Liquid or very soft diet is ordered while the temperature remains high. Where milk is the principal food, from three to four pints are usually given in the twenty-four hours (from four to six ounces every two hours), being well diluted with either plain or aërated water. Milk may be alternated with koumyss, chicken-broth, beef-tea, mutton-broth, albumen-water, or weak cocoa, and plenty of water should be given to drink, whether asked for or not. Wine, jelly, junket, ice-cream, fruit-juices, strained lemonade, iced tea, or coffee may be given occasionally. The objection to

milk is that it forms hard curds; some physicians object to its use altogether and order instead any soft nourishing food, such as is allowed after the fever has abated. One of the latest phases of treatment is to give water to drink—all the patient can be made to take—every fifteen minutes. Whether or not a patient shall be wakened for his nourishment at night is to be decided by the physician.

Soft food, in the form of eggs, milk-toast, custards, and jellies, is usually ordered when there is no fever in the evenings, but physicians do not, as a rule, allow any solid food until a week or ten days after the temperature has become normal, and then it is necessary to begin with small amounts. Milk or food of any kind should not be allowed to remain beside the patient or anywhere in the room. Especial care should be taken to disinfect the dishes used for typhoid patients, and no milk or food of any kind intended for other patients should be allowed to come in contact in any way with a typhoid case, as the bacilli which cause the disease find in them suitable media for growth and development.

The ventilation of the room, the cleanliness of the patient's person and of his bed, the disinfection of the linen and of the excreta (of the urine as well as the fæces), regularity in diet,—all are things to be very particular about in caring for a case of typhoid fever. The patient should be turned from side to side frequently, and his back supported by a pillow. Bedsores must be prevented, and any evidence of local inflammation or abscess at once reported. Signs indicative of other complications — meningitis, nephritis, pneumonia, phlebitis, otitis media, and heart exhaus-

tion—should also be watched for. Pregnant women usually abort during typhoid.

Typhoid is probably contagious only through the urine, and fæces, but nurses should always be careful to disinfect their hands thoroughly after working over a patient, and especially before going to meals. Water is one great source of infection, and should be boiled before it is used if there is any suspicion that it is contaminated. Massage is a great help in convalescence in overcoming emaciation and weakness; it aids in establishing health more quickly.

Malarial fever is an infectious disease due to animal organisms that invade the blood and rapidly destroy the red blood-corpuscles. It is characterized by an intermittent type of fever, a paroxysm occurring usually every day or every second, third, and much more rarely every fourth. There is also a remittent type and a chronic type. The most frequent form is the intermittent, in which there are definite chills. Three distinct stages may be observed: first, the cold stage, in which the patient has a chill of greater or less intensity, lasting from ten to fifteen minutes to more than an hour, during which time he suffers from intense headache, backache, sometimes nausea, and vomiting, the temperature rising rapidly; in the second or hot stage the patient feels as though he were burning up, the face is deeply flushed, and the temperature goes to 105° F. or higher: after from three to five hours the temperature falls, and we have the third stage, in which there is profuse perspiration, the headache and other symptoms subsiding, and the patient, though weak, feels better. The attack may come on the next day (more often one day is missed) unless

something is done to destroy the organisms in the blood. During the paroxysm the patient may be made more comfortable by hot bags to the trunk and feet, with an ice-cap to the head; for the intense thirst aërated waters or lemonade may be given, the latter being particularly acceptable. A sponge-bath is often ordered to be given both during and after the fever, and when the patient has ceased to perspire the linen should be changed. If the infection persists, a condition known as chronic malaria may be established, with development of a marked anæmia from decrease in the number of the red blood-corpuscles.

Quinine, best given in solution, but often also in capsules or wrapped in rice or tissue paper, is the specific remedy against malarial infection; from fifteen to thirty grains daily for three days, given in divided doses, is the amount usually prescribed. Smaller doses are then given for the next two or three weeks.

Scarlet Fever is also a contagious disease which has a stage of invasion, one of eruption, and a third of desquamation. The time of incubation is variable, being from four to seven days. The symptoms begin abruptly; there may be slight indisposition for a day, that may be taken for the beginning of an ordinary cold, but the temperature increases, and very soon rises to 102° or 104° F.; a higher temperature than this indicates a grave condition. The pulse-rate in mild cases is from 110 to 120, but in severer cases it may reach 160 or more. There are usually headache, chilly sensations, nausea and vomiting, the tongue is coated, and there are more or less dryness, soreness and swelling of the throat.

The rash generally develops on the second day,

appearing first on the neck and chest in reddish spots and patches, which extend over the back to the trunk, and finally over the whole body. The lips and chin usually remain free. In mild forms the rash does not change in appearance, but in marked cases it takes on a vivid scarlet color. The so-called "strawberry tongue," due to swelling of the papillæ, now appears, the throat becomes red and swollen, and an exudate may sometimes be present closely resembling the false membrane of diphtheria. The duration is variable, depending upon the violence of the attack. In a typical case the rash gradually fades, and from the sixth to the tenth day desquamation begins, and is not completed until the twelfth day or even later; often the peeling takes three weeks or more.

There are various types of scarlet fever, from the mild form lasting a week or so, to the most serious kind, known as malignant scarlet fever, and which sometimes terminates fatally in two or three days; in the latter form the temperature may be very high, 109° F. or more, the pulse rapid, the restlessness extreme. These symptoms may be followed by delirium and coma in which the patient dies. The throat symptoms are sometimes pronounced, and in this form the appearance of a membranous exudate is not infrequent; the rash is dark red, and may even be hæmorrhagic. The patient must be completely isolated, and nothing should be left in the room in the way of furniture except articles which are absolutely necessary. In the mildest forms the patient must be kept quiet and in bed until the end of the fourth week, as nephritis is very liable to follow even these cases. When the fever is high, sponge baths, tub-baths at a temperature of

the fever is usually not high; in the beginning it may rise to 102° or 103°. There may be nausea, vomiting, and great thirst. The duration of the disease is from four to twenty-one days. The amœbic or tropical form of dysentery is characterized by the presence in the stools of an animal organism called the *Amoeba coli*. It is also met with outside the tropics; the stools, as a rule, are frequent and have a characteristic odor, which may be rendered much less offensive by the use of permanganate of potassium as a deodorizer. The patient is to be kept warm and quiet in bed in all forms of dysentery, and liquid diet, usually milk, chicken broth, barley water, whey, malted milk, mutton broth and albumen water, is ordered. If curds appear in the stools, the amount of milk is to be lessened, or egg-albumen and beef-juice may be substituted. A flannel binder should be worn. Pain and tenderness are relieved by turpentine stupes or hot fomentations. If injections of quinine or other drugs into the colon are ordered, they should be given in large quantities, high up and very gently, the hips of the patient being elevated. Antiseptic precautions are to be taken with the tube and vessels after use, the patient must be kept scrupulously clean and his linen and the discharges must be sterilized. Cold applications to the anus sometimes relieve the tenesmus.

Asiatic Cholera.—From bacteriological studies of this infectious disease it has been found that it is due to a specific bacterium present in the evacuations from the bowels. and that it is probably contagious chiefly through the stools or by the contamination of water used for drinking and household purposes. In consequence, rigid disinfection of the stools and of the

linen is necessary, and only boiled water and well-cooked food should be taken when the disease prevails. The stools of cholera patients are at first yellowish in color, but soon change to the so-called "rice-water" stools; they are profuse and very frequent. Severe cramps and constant vomiting are generally associated with them, so that unless the disease is checked the patient soon falls into a condition of exhaustion and collapse. Hot applications may be made over the abdomen and heat applied about the body; warm injections of tannic acid have been used with some success, and subcutaneous injections of warm salt solution (4 grammes of salt to the litre) are recommended as valuable, in that they supply the loss of fluid from the blood and system consequent upon the profuse watery evacuations. Opium is usually given to control the pain, and plenty of ice-water to allay thirst. Kneading and hot baths for the cramps are sometimes ordered. There is no great danger in nursing a case of cholera if sufficient attention be given to the food one takes, the water one drinks and the disinfection of the hands. Very careful nursing is necessary during the convalescent stage and a restricted diet should be maintained for some time.

Small-pox, or *variola,* is one of the most virulent of diseases. The poison is present in the secretions and excretions, being given off chiefly from the lungs and skin. The stage of incubation is from seven to fourteen days; the disease proper begins suddenly with chills, intense headache, severe pains in the back, and vomiting, the temperature rising rapidly to 103° or 104° F., with a full, rapid pulse. On the third or fourth day the rash appears in the form of small red

spots, showing itself first along the junction of the forehead and hair, whence it spreads to the mouth and over the body. When the rash appears the temperature falls, and the spots or papules gradually develop until the fourth day; they then become vesicular and about the sixth day pustular. With the suppuration the temperature again rises, and there is much swelling of the skin about the pustules, with tension and pain, more particularly in the face. In the discrete form, where the pustules remain separated, the temperature drops in a short time and convalescence begins, the swelling subsiding, and the pustules drying up and desquamating; in the confluent form, however, the pustules increase in size, run together, break down and form crusts over the surface of the skin, particularly of the face and hands, until about the third week, when the fever abates and the crusts gradually dry up and drop off, provided the patient has survived the attack. In the confluent form there is great thirst and often delirium; the danger is greatest in such cases about the tenth or eleventh day, being in proportion to the intensity of the eruption. Broncho-pneumonia is a frequent complication. Other complications, inflammation of the middle ear, pleurisy, endocarditis and nephritis, are sometimes met with.

In caring for a small-pox patient strict isolation is the first thing; the best hygienic measures should prevail, the air being fresh and kept at a temperature of 65° F. The patient should be lightly covered. To reduce the fever either cold sponging or tub-baths may be ordered. The food must be liquid (milk, gruels, eggs, wine), and water may be given freely. The hair should be closely cut and the face should be pro-

tected by a mask made of lint dipped in hot or cold water or in a 1-per-cent. carbolic-acid solution, and then covered with oiled silk. When the scales begin to form, to prevent them from scattering and to keep the crusts soft, vaseline or oil is applied and warm baths are given daily. Dilute carbolic-acid solutions are useful in counteracting the offensive odor. Particular attention should be paid to the eyes, mouth, and throat, and all sponges or dressings used should be burned at once. If possible, the patient should be in a room with an open fire, which renders this burning a matter of little inconvenience. Isolation should be kept up until the skin returns to its normal condition. All persons, including the nurse, who come in contact with a case of small-pox, should be vaccinated immediately.

Diphtheria is an acute, infectious and highly contagious disease, the result of a specific germ which gives rise to a fibrinous exudate which may appear upon any mucous surface or wound, but most commonly affects the mucous membrane in the throat, with severe general blood-poisoning. The germ attaches itself to the clothing, the bedding, and the room in which the patient has lived. It is very resistant, and may be found months after on articles that have been exposed to it. Hence care should be taken to destroy or thoroughly disinfect anything in the way of toys or books that may have been in the room of a diphtheria patient.

The period of incubation is from two to seven days. The first symptoms are a chilly sensation, headache, a general aching of the muscles, some soreness and swelling of the throat and great prostration. The

membrane is first seen, as a rule, upon the tonsils, and becomes more or less extensive according to the severity of the case. At first it is of a grayish-white color, which afterward changes to a dull gray. The temperature ranges from 102° to 103° F., but may be lower. The glands beneath the jaw are enlarged. In nasal diphtheria there is a thin purulent or bloody discharge which causes sores in the nostrils and on the upper lips. Hoarseness, a croupy cough, or noisy difficult inspiration may indicate extension to the larynx. The sick person is to be strictly isolated and his clothing and surroundings disinfected. Other children in the house are to be carefully watched, given prophylactic gargles or even injections of antitoxin. The temperature of the room should be about 68° and thorough ventilation should be secured. The air may be kept moist by means of a steam-kettle, or a screen may be arranged about the bed so that the child may breathe an atmosphere saturated with moisture. Local applications, hot or cold, are made to the throat, and everything is done to keep up the patient's strength, in order that he may be able to resist the effects of the poison on the system. Plenty of water to drink may be given. The food should be liquid, milk, beef-juice, barley-water, albumen-water and soups. Where there is difficulty in swallowing, on account of obstruction and pain in the throat, nutritive enemata should be used. In laryngeal cases, intubation is resorted to early in the disease rather than as a last hope. The tube is passed into the larynx, and feeding is done by means of a rubber tube passed into the œsophagus through either the mouth or nose. Where artificial feeding is not used, the head should be lowered and the milk be

poured slowly and in very small quantities down the throat. In diphtheritic paralysis, if swallowing becomes very difficult, the patient may be fed with a stomach tube in preference to rectal feeding. General prostration may be very marked toward the end of the attack. Stimulants are often ordered from the beginning. As the disease is very contagious, a nurse in swabbing out the throat should be careful not to become infected herself by any discharge that may be expelled during coughing or when she is applying the disinfectants. The expectoration should be received in small squares of muslin and at once burned. The strictest quarantine should be established, and only the nurse, doctor, and possibly the child's mother, be allowed to come near the patient. The bed-linen, dishes, and room should undergo the most rigid disinfection before being again put into general use.

Temporary paralysis is not infrequently a sequel of diphtheria; it may come on as late as a month or six weeks after convalescence. It may be local, affecting only the muscles of the throat and palate, or it may be more general, and include the muscles of the limbs. The eye-muscles, too, are often paralyzed. The nurse will, therefore, be on the watch for signs of nasal speech, regurgitation of fluids through the nose, or inability to focus the eyes on near objects. Heart failure may occur even after convalescence has commenced, and any undue exertion should be avoided. A nurse should be more than ordinarily careful of her own health while taking care of a case of diphtheria, and it is a good plan to use preventive treatment by gargling the throat and possibly taking a tonic; the physician will no doubt see to this where the nurse has but little

sleep or opportunity for daily change of air. Immunity to diphtheria may be established by means of injections of the diphtheria antitoxin. In favorable cases the effects of the serum are seen in the marked amelioration of the local and the general symptoms. Within twenty-four hours the swelling of the fauces subsides and the membrane begins to disappear. At the same time the temperature falls, the pulse becomes stronger and the general condition of the patient improves in every way. The earlier the cases come under treatment the better are the results. Among the untoward effects of the treatment which are occasionally met with, is the development of a local abscess, diffuse erythema, urticaria, and albuminuria. None of these are, however, serious. Since the use of the antitoxin the mortality from this disease has been greatly reduced. The dose of the serum varies according to the severity of the case, but as it is harmless it is always safer to give relatively large amounts. The injections are made most commonly into the loose tissues between the shoulder blades or into the buttocks. Isolation should be maintained until the cultures from the throat have proved negative for three successive days.

Pulmonary tuberculosis. After all that has been written on the subject, thousands of valuable lives are lost every year because people will not understand that one case of tuberculosis can be the cause of many others. and that the disease, which is commonly called "consumption," could, with proper precautions, be almost entirely stamped out.

The disease may be either acute or chronic. In the acute form in the early stages there is consolidation of

the lung, and later softening or excavation, which follows the liquefaction of the necrotic tissue.

The bacilli enter through the air-passages and lodge at some point on the respiratory surfaces. The most frequent starting-place is at the termination of a bronchiole, just before it opens into the lung alveoli. The apex of one lung is most often first attacked. The symptoms are a dry, hacking cough, with gradual but steady emaciation and loss of weight; there may be sharp pain in the side, with a rapid and feeble pulse, the temperature being normal or subnormal in the morning and elevated in the evening When cavities form, there may be occasional chills, and profuse sweating may occur, especially when the patient is asleep. The expectoration is opaque, muco-purulent, and contains tubercle bacilli, and in the later stages elastic tissue; it may be glairy, tenacious, and streaked with blood, and will become more profuse when the breaking down of the lung tissue has begun; there may be nausea, vomiting, and diarrhœa, particularly late in the disease. The skin has a pearly pallor, the hectic flush appears on the cheeks, and the eyes are bright and glistening. Hæmoptysis is sometimes the very first symptom, and it may occur at intervals throughout the disease. The acute form is generally rapidly fatal, but if taken in the early stages may be curable.

Life in the open air and a superabundance of nourishment even to the point of forced feeding is the treatment now insisted upon, the object being to increase the patient's resistance to the highest point. Absolute rules as regards rest are laid down by the physician for each individual patient; generally speak-

ing an hour's absolute rest just before and after each meal, a daily bath, a certain amount of walking in the open air if the patient has no fever, and sleeping with windows wide open or entirely in the open air, with a set amount of nourishment suited to the individual case are insisted upon. The temperature should be watched carefully and taken at least twice daily; the mouth and teeth should receive particular attention; the patient should be weighed once a week. Since the prospects depend in a large measure upon the condition of the stomach, foods which are too rich and heavy should be avoided. The diet should be mixed and varied. Meat, eggs, vegetables, cereals, fish, fruit, tropon, plasmon and sanatogen, are all good. Milk, to the extent of two or three pints or more daily, should be given; if necessary a little tea, coffee, salt or brandy may be added to it. Some patients prefer sour milk, cream or koumyss. The best means of isolation are afforded by sanitaria and special hospitals for tuberculosis. The tent system—for winter as well as summer—is growing in favor.

In the chronic form the progress of the disease may sometimes be arrested. The treatment consists principally of hygienic measures. Warm flannels, good nutritious diet, a great deal of outdoor life and complete rest—all are valuable; later, gentle exercise may be permitted, when the patient has no fever and can stand it without suffering from over-fatigue; a change of climate, especially to a high mountainous district may be beneficial.

The danger lies in the tuberculous sputum which should be at once burned or else put in a strong disinfectant solution, as it contains enormous quantities of

the bacilli. These, if allowed to become mixed with the dust, become scattered broadcast, carrying infection everywhere.

The patients must be made to use sputum-cups; they should never be allowed to expectorate into a handkerchief, unless it is made of cheese-cloth or paper which can be burned at once, or, in fact, anywhere except into the proper receptacles. The sputum-cups can be sterilized by steam or by being boiled in a 2 per cent. soda solution, or they may be made of paste-board and burned. We scarcely need the support of a theory of heredity in consumption: when we think of a child kissing a parent, perhaps many times daily, over whose lips thousands of tubercle bacilli are hourly passing, and when we think of that same child inhaling the dried bacilli and their spores, which always float about in the dust of a house containing ignorant or careless tuberculous patients, it would seem strange that the disease does not occur still more often. The popular literature on the subject of tuberculosis is extensive and on the increase. Strenuous efforts are being put forth to bring the laity into line to combat the disease, and special facilities for its treatment are rapidly increasing the world over. The trained nurse is realizing more and more her responsibility and the important place she holds in the prevention and cure of tuberculosis. With the discovery that tuberculosis is a germ disease and that it is not necessarily hereditary, it at once took rank with the preventable and curable diseases. Under favorable circumstances the hope for complete or partial recovery is justifiable in a large percentage of cases.

CHAPTER XXV.

THE NURSING OF CHILDREN.—CONVALESCENT CHILDREN.—THRUSH.—CHOLERA INFANTUM.—CONVULSIONS.—INFANTILE PARALYSIS.—CHOREA.—RICKETS.—CROUP.—ECZEMA.—THE INFECTIOUS DISEASES OF CHILDHOOD.

The two periods of childhood are *infancy,* which extends from birth to the age of two and a half years, and *childhood* proper, beginning at that age and lasting until the fourteenth or fifteenth year. The conditions of life during this time are very different from those of mature growth, and the principles upon which adults may be treated will not always apply to children; nor is the same kind of nursing suitable, for a nurse who may be entirely satisfactory for grown people sometimes utterly fails in caring for children.

The children's ward should always be looked upon as a special department to which every nurse should go after a general experience in nursing to acquire a thorough practical knowledge of a most important specialty—the care of infants and children in health and disease. If all trained nurses—and not only those who expect to do district work—were thoroughly competent in this branch, we should have a large body of women whose influence and work would be of incalculable benefit in decreasing the present lamentable mortality among infants and young children.

In dealing with children, besides tact and plenty of patience, there must be a certain sympathy that the little ones are always quick to feel, and this combined

with judicious firmness will make a nurse successful in the management of either well or sick children of any age. When children are sick the habit of observation on the part of the nurse is in the highest degree important, for, the patients being helpless and unable to properly understand or explain their own feelings, we have to depend upon signs to tell us where the trouble is located, and we may be able to gather facts of much importance from what are apparently quite trivial symptoms.

The first attention to give the new-born is to wash the eyes as soon as the head is born, and to see that normal respiration is established. It is desirable, of course, that this should take place before the infant is separated from the mother. Some obstetricians hold that the cord may be cut directly the child has breathed a few times, while others maintain that in normal cases, and in the absence of any special indication, this should not be done till pulsation in it has entirely ceased. If respiration is not established after the removal of mucus from the mouth and contact with the air or by slapping the child on the back, a few motions according to Sylvester's method of artificial respiration may start the breathing, or mouth to mouth respiration may be tried. This may be instituted before separating the infant from the mother, but, as a rule, the cord should be cut as quickly as possible, and the child removed while some one else gives the necessary attention to the mother. Cold water may be sprinkled on the face and chest, and if this fails, immersions in hot water at 106° F. and sprinkling with cold water must be resorted to. Another method of artificial respiration is that of Schultze. The operator, facing the child's

back, puts an index finger into each axilla and his thumbs over the shoulders, so that their ends overlap the clavicles and rest on the front of the chest, the rest of the fingers going obliquely over the back of the chest. The child is first suspended perpendicularly between the operator's knees. Its whole weight now hangs on the index fingers in the axilla; by these means the ribs are lifted, the chest is expanded, and inspiration is mechanically produced. The infant is now swung upward till the operator's hands are just above the horizontal line, when the motion is abruptly but carefully arrested. The momentum causes the lower limbs and pelvis of the infant to topple over toward the operator. The greater part of the weight now rests on the thumbs, which press on the front of the thorax, while the abdominal viscera press upon the diaphragm. By these two factors the thorax is compressed and we get, mechanically, an expiration. After five seconds the first position is again resumed, and the lungs expand and fill with air. This process may be repeated several times until the breathing seems to be going on naturally. With delicate infants it should be the last resort.

After respiration has been established, the child is wrapped in a warm flannel with hot-water bags or cans near it, and left until the mother has been cared for. Infants at birth are covered with a white, greasy substance—the vernix caseosa, or "cheesy varnish"; this begins to form during the fifth month, and protects the skin from the action of the amniotic fluid; it is removed by applying olive oil or vaseline and afterwards rubbing the skin gently with a soft cloth. The eyes and mouth should be washed out with pure warm wa-

ter, separate squares of soft linen being used for the purpose. If the baby has been born prematurely or is very small, weak and undeveloped, it should be given an oil bath, after which it should be wrapped in cotton wool and kept at a temperature of not less than 80° F. for the first ten days or fortnight. In hospitals, incubators are used for this purpose; in private houses, as a rule, an attempt must be made to obtain the same results in other ways.

To a fully-developed child the first bath may be given at once. Before beginning, everything necessary should be ready at hand—a foot-tub, warm soft towels, warm water, castile soap, olive oil or vaseline, small squares of muslin or linen, dusting powder, a dressing for the umbilicus and clothing, the latter consisting of a diaper, a flannel band, a shirt, long woolen stockings, a loose long-sleeved flannel petticoat, and a simple soft white outside garment—the two last long enough to more than cover the feet. The child should be wrapped in flannel, and only the part which is being bathed at the moment should be exposed.

The eyes are first bathed, separately, and afterwards the face, no soap being used, the head is then washed in warm, slightly soapy water; very little soap should be used with infants, as it is more or less irritating, and is apt to injure the fine texture of the skin. Next one should carefully clean the parts behind the ears and the crevices of the neck, axillæ and joints, and those between the buttocks and thighs. It is well at this time to notice whether all the natural openings of the body are perfect; finally, the baby is put down into the tub of warm water at about 96° F. and washed off. The head and back should be firmly supported

with the left hand and arm during the bath. After a minute or two the baby is lifted out, held face downward for a moment and rinsed off with clear warm water. It is then wrapped in a warm towel and flannel, and dried, not by rubbing but by "patting." Although one is accustomed to see the nurse hold the baby in her lap, it is a much better plan to have a table large enough to hold everything necessary for the bath, including the bath-tub and a pillow upon which to place the baby. The nurse can then undress, bathe and dress the baby without stooping and with greater comfort to the child. Powder should not be used except where there are signs of chafing, when the best to use is stearate of zinc. The navel is then dressed, a hole being cut in the centre of a of a square of sterilized lint or linen, which is slipped over the cord and folded about it; the cord is then laid toward the left side, and over it is put another small sterilized cotton pad which is held in place by the flannel bandage, the nurse being particularly careful that this is not drawn too tightly. The binder may be kept on by sewing it smoothly with half a dozen large stitches, thus avoiding the danger of injury from pins. As a matter of fact, it is now held by some of the best obstetricians that a binder, far from being a necessary article, is calculated to do harm to the infant, owing to the undue pressure exerted by it upon the ribs and the diaphragm. It certainly serves a useful purpose in retaining the dressings applied to the navel and in affording extra warmth. After the cord drops off, the looser knitted band should be substituted. After the first bath the child is not bathed in the tub again until after the cord has dried up and is

ready to fall off, which will usually occur on about the fifth or sixth day, although the process may be delayed until the ninth day. During the bath the temperature of the room should be about 80° F., and the greatest care be taken not to expose the child more than is necessary to the air. After the bath the infant should be laid away in warm flannel wraps on its right side, on a firm mattress without any pillow. The room should be warm but not too hot, as an equable temperature of about 80° F. can be maintained for the first two weeks by the judicious use of hot-water bags and wraps. If care is taken in this particular, the child will probably sleep the greater part of the time, and afterwards it may gradually be exposed to a lower degree of temperature. Within twenty-four hours after birth the first discharges from the bowels should come away; these consist of a dark greenish material, and are known as the meconium. If the meconium is not evacuated and the child has pain, a soap suppository held in the rectum for a few minutes will produce a favorable result. An old piece of muslin should be laid in the diaper to catch this discharge, and the whole burned, as it is difficult to wash the stain out of the diaper. The urinary organs should also be watched, and if urine is not voided, flannel wrung out of hot water may be applied to the abdomen just above the symphysis pubis. Water to drink should be given from a nursing bottle. The urine of the newborn child during the first few days, may contain uric acid in abundance. Such urine is apt to be scanty, and gives a pinkish or brick-dust stain to the diaper, while the normal watery urine does not stain. Such uric acid formation probably represents a not infre-

quent cause of colic (renal, not intestinal), during the first days of life, and suffering and illness may be prevented by the free use of warm water. Each time the diaper is removed the parts should be bathed in warm water, carefully dried, and a perfectly clean diaper put on. The breasts of babies of both sexes sometimes become swollen toward the end of the first week, and contain a fluid resembling milk. The swelling will gradually subside, and should not be interfered with, as irritation is apt to cause inflammation and ulceration which might permanently destroy the functions of these glands; all pressure upon them should be guarded against.

All the baby's habits should be made as systematic as possible; there should be regular times for sleeping, feeding and bathing from the very first.

The best food for an infant is of course the mother's milk. Certain pathological conditions in the mother, however, make it injurious; thus the existence of tuberculosis, fissured nipples, typhoid fever, or pneumonia is a contraindication to the nursing of the child, although in a case of abscess of one breast the other, if it is healthy, may sometimes be used. The infant at first should nurse every two hours during the day, and every three hours at night, say at eleven, two, and five. After the first six weeks this may be changed to every three hours during the day and twice at night. Between meals, if there be much crying, a little plain or sweetened water may be given, as the child is probably only thirsty. Water should be given regularly to drink in any case. Persistent crying does not occur without a cause in these early days of life, and is usually due to indigestion from over-feeding or from im-

proper food, to gas-accumulation, thirst, or cold. Goat's milk is the best substitute for mother's milk, but it is not easily obtained, and cow's milk is obviously the next best. Everything else being equal, the mixed milk of a herd of cows gives the best results. The animals must be healthy, well cared for and clean, and all vessels into which the milk is put from the moment it comes from the cow until it is given to the baby must be kept scrupulously clean and uncontaminated. In the modification of milk the problem is to change the quantities of the constituent parts of cows' milk so that the proportions shall correspond to those found in human milk. The system of percentages—the way in which exact proportions can best be expressed—was introduced mainly by Rotch and Holt. The latter's schedule, giving the amount at each feeding and the proper intervals for normal children is as follows:

SCHEDULE FOR FEEDING HEALTHY INFANTS DURING THE FIRST YEAR.

AGE.	No. of feedings, 24 hours.	Interval between meals by day.	Night feedings (10 p.m. to 7 a.m.)	Quantity for one feeding.		Quantity for 24 hours.	
		Hours		Ounces	Grammes	Ounces	Grammes
3d to 7th day	10	2	2	1–1½	30–45	10–15	310–460
2d and 3d weeks . .	10	2	2	1½–3	45–90	15–30	460–930
4th and 5th weeks .	9	2	1	2½–3½	75–110	22–32	680–990
6th week to 3d month	8	2½	1	3–4½	90–140	24–36	740–1,110
3d to 5th month . . .	7	3	1	4–5½	125–170	28–38	870–1,280
5th to 9th month . .	6	3	0	5½–7	170–220	33–42	1,020–1,300
9th to 12th month . .	5	3½	0	7½–9	235–280	37–45	1,150–1,400

After the third month in the case of a normal child no food should be given between the hours of 10 p. m. and 6 a. m. The food should not be given too quickly;

the child should be nursed for about 15 minutes, both breasts being emptied in that time. A bottle baby should be held while it takes its food.

If milk prepared according to the above schedule does not agree with any individual child, the proportions must be changed until a combination is arrived at that the child can readily digest. For sick children the changes will usually be still greater. The establishment of milk laboratories in many of our large cities has made it possible to secure a food which in fat, sugar and albuminoid percentages can be made accurately to correspond with breast milk. These laboratories have their own herds, and take the most scrupulous care in the handling of the milk to secure its purity. In the laboratory the cream is separated by a centrifugal machine. In this way 16 per cent. cream is obtained which is combined with the separated milk, a standard 20 per cent. solution of milk sugar, and a standard lime-water solution. The percentages of fat, sugar and albuminoids can thus be varied, as much as is desired, the lime-water giving a slight alkaline reaction to the modified milk. In ordering the food the physician writes for the percentages desired, the number of feedings, and the amount of each feeding, in some such a prescription as the following:

Child of three months:

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Fat, 3 per cent.;
Sugar, 6 per cent.;
Albuminoids, 1.50 per cent.;
Alkalinity, slight.
Number of feedings, 8.
Amount at each feeding, 4 ounces.

The home modification of milk may be accomplished by using the following standard formula as a guide:

TABLE FOR PREPARING MODIFIED MILK FOR A HEALTHY INFANT OF AVERAGE WEIGHT DURING THE SUCCESSIVE STAGES OF ITS LIFE FROM ONE DAY TO ONE YEAR.

Age of Infant.	1st day	2nd day.	3rd-14th day.	14th-28th day.	2nd month.	3rd month.	4th-6th month.	6th-8th month.	8th-12th month.
Milk	None	None	1 oz. 4 dr.	1 oz. 4 dr.	4 oz. 6 dr.	4 oz. 6 dr.	5 oz. 4 dr.	13 oz. 4 dr.	23 oz.
Cream (16 per cent. fat)	None	1 oz.	1 oz. 4 dr.	1 oz.	4 oz. 2 dr.	6 oz. 6 dr.	8 oz.	7 oz. 4 dr.	7 oz.
Milk sugar (by measure, *not* by weight)	3 dr.	4 dr.	6 dr.	1 oz. 1 dr.	1 oz. 2 dr.	1 oz. 7 dr.	2 oz. 1 dr.	2 oz. 4 dr.	2 oz. 4 dr.
Lime water	None	3 dr.	4 dr.	6 dr.	1 oz.	1 oz. 4 dr.	2 oz.	2 oz. 4 dr.	3 oz.
Total quantity for 24 hours (made up by addition of water)	5 oz.	8 oz.	12 oz.	18 oz.	24 oz.	30 oz.	36 oz.	42 oz.	48 oz.
Quantity in each bottle (for one feeding)	4 dr.	6½ dr.	1 oz. 1 dr.	1 oz. 6 dr.	3 oz.	3 oz. 5 dr.	4 oz. 4 dr.	6 oz.	8 oz.
Total number of bottles	10	10	10	10	8	8	8	7	6
Intervals between feeding	2¼ hrs.	2¼ hrs.	2¼ hrs.	2¼ hrs.	3 hrs.	3 hrs.	3 hrs.	3½ hrs.	4 hrs.

The cream should be obtained by allowing the milk to stand undisturbed in a cool place for six hours and then pouring off the top creamy part. The milk sugar is dissolved in double the amount of hot water. For measuring purposes a standard medicine glass is needed. The ingredients are poured into a graduated glass jug and water is added to the required mark. The mixture is then poured into bottles, a separate one being provided for each feeding. These are then stoppered with sterilized cotton and placed upon ice. Before the food is given to the child the bottle is placed in cold water which is gradually heated until the milk is warm. The temperature should be tested

by shaking two or three drops upon the back of the hand. The following formula suggested by Meigs may also be used:

1 part milk;
2 parts cream;
2 parts lime-water;
3 parts sugar-water.

The sugar-water is made by adding one ounce of pure fresh sugar of milk to a pint of water. This formula approximates in chemical composition to mother's milk. When the modified milk cannot be obtained, another simple formula is as follows: equal parts of milk and plain boiled water, sweetened with milk sugar, with 1 grain of bicarbonate of soda to each feeding; after six months, 2 parts of milk to 1 of cereal water. The cereal water is made by taking barley or oatmeal, one tablespoonful to a quart of water; reduce to a pint by slowly boiling, then strain. The milk is better not sterilized or pasteurized, if it is clean, fresh and properly handled. If there is any doubt during the hot months from May until November these preparations should be sterilized with steam at boiling point for ten minutes.

The greatest care should be taken with the bottles, nipples and stoppers. To have them thoroughly clean and aseptic, the bottles and nipples used should be boiled each day in a 2 per cent. solution of carbonate of soda for five minutes, and afterwards in plain water. After each feeding the bottle should be washed in cold water and then boiled, after which it is turned upside down and allowed to drain. The nipples after being boiled are kept in a weak solution of boric acid. No change in the form of food need be made before the

ninth month, but it will have to be given, of course, in increasing quantities, and the proportions of the milk and water must be changed. Unless the milk is known to be quite fresh, it is safer to have it sterilized—that is, rendered free or at least comparatively free from micro-organisms. If fermentative changes have already taken place, sterilization will not render milk fit for food. A special apparatus may be had at little expense for this purpose, but where it cannot be obtained an ordinary nursing-bottle may be used. A wire caster frame for holding the bottles may be bought at any drug-store. The bottles filled with milk are put in the caster and placed in a double boiler, the water being kept at a temperature of 165-170° F. for an hour. If an Arnold sterilizer is available the milk can be pasteurized if the outside jacket is taken off and the heating is continued for only half an hour, when the milk may be put away in a cool, dark place. Several bottles may be sterilized at one time, enough to last for twenty-four hours, one bottleful being used for a meal; if any milk is left over after a feeding, it should be thrown away. Milk for use on a journey of two or three days' duration may be prepared in the same way, only that the steaming process must be repeated for three successive days, just as for the sterilization of salt solution, the preparation of which has been described elsewhere. Of late there is some evidence to show that children fed for a long time on this milk (sterilized at 100° C.) do not do well. It is probable that the high temperature produces certain chemical changes in the milk which lessen its nutritive properties. Subjecting the milk to a temperature of 60 to 70° C. for half to three-quarters of an

hour—*pasteurization*—will destroy the bacteria likely to be present, thus delaying fermentation, and secures the advantages without the drawbacks of heating the food at the higher temperatures.

After birth several physiological changes take place in the child. The bones, which at first are very soft and flexible, require some months to ossify and become firm enough to support the child, so that it can stand alone. A child should not be allowed to try to stand before it is a year old, and if permitted to sit alone it should not be left in this position for any length of time, unless some support is given to the back, because curvatures are apt to result if the weight of the body is thrown too early upon the slender bones. A child should be very carefully handled, as tossing it and throwing it up and down may cause serious injury.

The head may be of a peculiar shape, which may have been caused by pressure during birth. The bones of the skull do not unite firmly for some months, and the fontanelles must not be pressed upon, but the greatest care should be taken to protect them from injury. The sutures are yielding, and sometimes at birth the edges of the bones overlap. Very marked peculiarities in the shape of the head or of its bones may disappear after a few weeks' growth.

The stomach at first is very small, and very little food, one or two teaspoonfuls, will be sufficient for one feeding; when too much is taken the surplus will be regurgitated, a condition often mistaken for vomiting.

The stomach capacity, however, rapidly increases. At the end of the first week an average child requires

from one to one and a half ounces at each feeding; in its second and third week, from one and a half to three ounces; in the fourth and fifth weeks, from two and one-fifth to three and a half ounces; from the sixth week to the third month, from three and a half to four and a half ounces; at six months, six ounces; and at twelve months, from eight to nine ounces are required.

The skin soon undergoes changes: during the first few days it is red, later it becomes yellowish, and after a few more days assumes its natural color. In catarrhal jaundice the conjunctivæ are also tinged. The sweat glands do not become active until after the first two months.

The average weight of a newborn child is seven pounds; for the first two days it loses weight, and after this gains from two to six ounces a week.

A baby should be weighed daily during the first weeks of life, and at less frequent intervals during the year, for its weight is the best index of its nutrition. The weight, the stools and the urine are all useful indications of the child's condition.

The following table shows the average gain of a healthy infant:

Age.	Monthly Gain.	Weight at end of the month.
First month	13¼ ounces	8 pounds 5½ ounces
Second "	30½ "	10 " 4 "
Third "	26½ "	11 " 15 "
Fourth "	26 "	13 " 9¼ "
Fifth "	21 "	14 " 14¼ "
Sixth "	21 "	16 " 3½ "
Seventh "	17 "	17 " 5 "
Eighth "	21 "	18 " 10 "
Ninth "	23 "	20 " 1 "
Tenth "	20¼ "	21 " 5¼ "
Eleventh "	11 "	22 " 0 "
Twelfth "	7 "	22 " 7 "

For the first six weeks a child should sleep twenty hours out of the twenty-four. From the very first it should be put quietly down, and allowed to go to sleep without rocking or nursing.

Regular bathing is of the greatest importance to a child's health. One bath should be given daily, not too close to the time for a meal, in a room of which the temperature is about 75° F. The temperature of the water should at first be 95° F., but after the child has reached the age of three months it may be lowered to 90° F. During the first three or four months the child should not be kept in the bath longer than two or three minutes.

At the age of six months it is well in the case of a healthy baby to finish the bath by a splash of cold water at from 65° to 75°, or with a cool sponging followed by a brisk rub.

The disorders common in the newborn are colic, jaundice, opthalmia neonatorum, thrush, and affections of the umbilicus. An inflammation of the umbilicus is probably always due to infection, and the physician's attention should be called to it at once. If any moisture appears about the cord, iodoform or, better still, a powder made of 1 part of iodoform to 6 parts of powdered boric acid, may be sprinkled about it, and a pad of sterilized gauze applied. The inflammation, unless checked, may prove serious, as the general strength fails rapidly, abscesses may form, and the child may die. If granulations appear after the cord has dropped off, nitrate of silver in solution or stick is usually ordered to be applied gently, the wound being afterwards dressed with the iodoform and boric-acid powder.

Colic is a very frequent disturbance, and one that begins very early in a child's life; it is due to an accumulation of gas in the stomach or intestines, and is usually caused by over-feeding, rapid feeding, improper food, or exposure to cold. The pain, which comes on in paroxysms, is sharp and griping. The child suddenly utters a sharp cry, the legs are drawn up, and on examination the extremities are found to be cold. With care in feeding and keeping the body sufficiently warm many of these attacks can be avoided, and frequently, when one comes on, the pain will cease if the child be held before the fire until it is well warmed through. Hot flannels to the abdomen have also been recommended, and internally a little warm water or peppermint-water may be given for two or three doses to relieve or expel the gas. The body may also be well rubbed with warm oil. Simply raising the child up often gives relief by facilitating the escape of gas. Stimulants, paregoric, soothing syrups (most of which contain opium) should not be given under any consideration, simple heat being in the majority of cases quite as effectual. In persistent cases the colon may be washed out with a pint of warm sterile water once a day.

Icterus, or *jaundice,* is often seen during the first and second weeks of life, but is not considered of much importance if the general health is good, as it subsides without treatment after a few days. The bowels should be kept freely open.

Ophthalmia neonatorum is an inflammation of the superficial tissues of the eye, particularly of the conjunctivæ. Both eyes are usually affected. In the newly-born the cause is to be sought for in an in-

fection during birth from the urethral or vaginal discharges of the mother, or the pus-producing organisms may be introduced afterwards by carelessness in handling. As a preventive the moment the child is born and before its eyes are opened, the nurse should wipe carefully away all discharges, using for the purpose separate small squares of cotton or gauze sponges wrung out of a weak solution of boric acid. The eyes should not be exposed to cold air. At the first bath the eyes should be bathed first, and the same piece of linen should never be used for both. In some lying-in hospitals, especially in suspicious cases, as a matter of routine one drop of a 2 per cent. solution of nitrate of silver is dropped into each eye. At the onset of ophthalmia a slight redness of the eyelid about its edges is noticed, with a little swelling; this condition rapidly becomes worse, and at the end of twenty-four hours the swelling has increased, so that the eye may be wholly closed; the eyelids and conjunctivæ are deeply injected, and pus oozes out. In some cases the purulent discharge is very abundant, and there will be danger of the destruction of the cornea by ulceration and perforation with resulting blindness for life. Upon the slightest indication of redness the eye should be frequently bathed with a warm weak solution of boric acid, and sometimes cold compresses will be ordered. The use of lotions and poultices should be avoided. In any case the physician should be notified at once. In bathing the eyes no friction should be used, and the lids should be gently held apart, no pressure being exerted on the eyeball. When pus appears, the eye should be washed out every hour, every half hour,

or even oftener. This may be best done by letting the solution run over it from a medicine-dropper. After being allowed to trickle from the outer to the inner angle of the eye, it will then run down beside the nose, and can be caught on a piece of absorbent cotton or sponge. Where there is much pus, the eye may have to be irrigated in this manner every fifteen minutes, day and night, as the only way to save the cornea is to keep down the inflammatory process. When this has to be done at such frequent intervals, a small fountain syringe with a glass nozzle attached will afford a steady flow of the solution. No forcible stream should be used. Precautions should be taken to prevent the other eye from becoming infected, and no particle of the discharge should be allowed to touch it; in very bad cases the sound eye is sometimes covered. All sponges and cloths used should be at once burned, and the basin which has held them filled with 1:20 carbolic-acid solution. The nurse's hands should be thoroughly scrubbed in hot water and soap, and disinfected with the same solution, as the disease is highly contagious and dangerous to adults. Touching the face or hair should be avoided unless the hands are quite clean.

Thrush, or *sprue,* is a disease in which small whitish spots or ulcers spreading into patches appear on the tongue, the sides of the mouth, and the gums of infants; in severe cases the process may extend over the entire cavity of the mouth, into the throat, and even down the gullet into the stomach; sometimes, although only very rarely, it has been known to invade the intestines. In serious cases the child may die of inanition, the throat and mouth being too tender and pain-

ful to permit of swallowing, or at other times death may result from the exhausting diarrhœa, which may be present. These patches result from the growth of a yeast-like fungus. Milk should not be allowed to remain along the sides of the mouth, but each time after food has been given the mouth should be washed out. The disease is combated with an alkaline wash, usually a borax solution (twenty grains to an ounce of water). It should be applied every two hours with a camel's-hair brush until signs of improvement appear. In all cases the child is fretful and irritable, and in the severer forms there will probably be diarrhœa. The discharges from the bowels are very acrid and cause excoriation of the buttocks and surrounding membranes, unless precautions are taken. Melted mutton suet applied to these parts forms a coating and protection against the irritating effects. Thrush sometimes appears in adults in the later stages of tuberculosis and of some fevers.

The character of the stools in infants should always be noted, as from their general appearance we can often tell whether the food they are receiving is suitable or, if not, what constituent is not agreeing with them.

Stools that are green when passed are pathological, but even normal stools may show greenish areas after they have remained on the diaper for some time. Curds in the stools consist of undigested material. Undigested fat usually takes the form of smooth flat or round masses about the size of a pea or bean. Hard whitish-yellow or greenish lumps are generally made up of casein. Too frequent yellow stools are often caused by the ingestion of too much cream.

Foul smelling stools are often due to an excess of albuminoids. In severe diarrhœas the stools are liquid but sometimes practically odorless.

Too often an attack of diarrhœa is neglected because it is ascribed to teething. In normal children, who are properly fed and cared for, the eruption of the teeth should take place without causing any marked constitutional or systemic disturbances.

Enteritis in children is known according to its form and severity by different names—viz. acute dyspeptic diarrhœa, cholera infantum, and acute entero-colitis.

Diarrhoea is a disorder that occurs among children chiefly during the hot summer months; and is attended with a high death-rate. The majority of cases are noted during the first two years of life. It is due, as are so many children's disorders, to disturbances in the digestive tract. It is more common where improper forms of food have been given, and where sufficient attention has not been paid to cleanliness. Bottle-fed infants are very liable to it, particularly among the poorer classes, owing no doubt to impure milk and ignorance on the part of the mothers, who neglect to keep the feeding-bottle clean. As a rule, a child should not be deprived of the breast-milk during the hot months of summer, as diarrhœa almost invariably follows, but there are cases in which the mother's physical condition is such that the physician is compelled to order an immediate weaning of the child.

With older children the diarrhœa is associated not only with the use of tainted milk, but frequently follows the eating of improper foods, such as unripe or decayed vegetables. In all cases it is believed that the diarrhœa results from abnormal fermentative pro-

cesses due to bacteria. Summer diarrhœa may be first signalled by an increased number of evacuations from the bowels, with griping pains in the abdomen, which make the child fretful and restless, or it may come on suddenly and manifest itself by vomiting, griping pains, frequent evacuations, and fever. Care in the diet, giving only rice-water or albumen-water, and keeping the child quiet in bed, if possible in the open air, may be sufficient. Castor oil or calomel, one-sixth of a grain every hour for six doses, is usually ordered at first to remove the irritating cause. In the more severe forms, where there is much irritation of the stomach or intestines, the stomach and colon are sometimes washed out. To wash out the stomach, a large soft-rubber catheter and glass funnel are used instead of the regular stomach-tube, and for irrigating the colon a catheter of the same size is used, being introduced as far as six or eight inches, and a pint or quart of lukewarm normal salt solution is allowed to pass in at one time; if there be fever, cold water may be substituted. An ounce or two of normal salt solution or sterile water is put in, and siphoned off. This is repeated until the flow is clear when an ounce is put in and left that the stomach may not remain empty. The baby should be allowed to sleep after this treatment. Milk, if given in severe cases, should be modified and sterilized. In severe cases nothing but warm water should be given for some hours. Egg-albumen, barley-water, or rice-water, may be given instead. Beef-juice or mutton-broth are, as a rule, inadvisable in the hot summer months. A formula often used is: milk 2 cups; cream 2 cups; lime-water ¼ cup; boiled

water $2\frac{1}{2}$ cups. Divide, put into feeding-bottles and sterilize.

In addition to a strict regulation of the diet, a change of air will generally prove of the greatest benefit. The poor emaciated weakling from the city is often restored in a very short time to health and vigor if it can be removed to the country.

Cholera Infantum, a disease less frequent than summer diarrhœa, but one which is extremely serious, is generally preceded by some mild disturbance of digestion, but may come on quite suddenly. It begins with continuous vomiting and frequent thin, watery stools, which are at first very offensive. The child has fever, the eyes rapidly become sunken and hollow, the features look pinched, and in extreme cases symptoms of collapse soon come on. The pulse is rapid and feeble; there is excessive thirst and restlessness at first, which may be followed by a condition of stupor. Starch and laudanum injections may be ordered; if so, they should be given cold and introduced high up, the starch having been previously well boiled. The child should be kept absolutely quiet. Plenty of water or cool barley-water may be given, and the food for a time will usually consist of egg-albumen with a few drops of brandy.

Entero-colitis, or *Catarrhal Dysentery,* is an acute inflammation of the colon and ileum, and may also follow an ordinary attack of diarrhœa. There are constant pain and fever, the stools are mixed with blood and mucus, and, in fact, sometimes consist almost entirely of these two elements. An attack may end fatally after forty-eight hours. Irrigation of the intestines may be ordered, and the nourishment is much

the same as in the other diarrhœas. In any of these diseases there are apt to be chafing and soreness of the skin about the hips, which is kept almost continually wet by the frequent discharges. The bathing may be done with very thin boiled starch-water in place of soap and water, or with soft cloths dipped in lukewarm olive oil, and the parts afterwards rubbed with vaseline and dusted with stearate of zinc or oxide of zinc finely powdered. A flannel bandage should be worn over the abdomen and stomach, and kept on until the child has fully recovered. For the prevention, as well as the cure, of all such diseases, the child should always be kept properly clothed, the abdomen being more especially protected. Other hygienic precautions and care are of the greatest importance. A nurse, particularly a district nurse, may do much towards the prevention of such cases. If she fully realize the importance of hygienic measures, and the results which almost certainly follow, and can induce the mothers to care for their infants properly, her privileges and opportunities for saving the lives of young children will be almost unlimited.

Constipation frequently occurs in infancy and early childhood. The bowels should be opened once in twenty-four hours. For an infant, fluid magnesia may be given in the milk. A small suppository made of soap held in the rectum sometimes may be sufficient, or, according to the age of the patient, from a teaspoonful to a tablespoonful of sweet oil may be injected by means of a small rubber syringe and allowed to remain from half an hour to an hour and then followed by a small, simple soap-suds enema. An injection of glycerin given with a medicine dropper to an infant

or half a teaspoonful to a larger child is also very successful in emptying the lower bowel. The glycerin suppository may be used instead. It is not safe, however, to depend daily upon these aids to emptying the bowels. It is better to look to the diet, giving plenty of water, and at the same time establishing the child in regular habits by putting it on the chamber at the same time each day. Nothing should be allowed to interfere with regularity in such habits. Gentle rubbing or massage of the abdomen with circular movements from right to left with a little sweet oil for ten minutes daily will help to increase the action of the bowels and bring on a normal movement. With older children plenty of exercise and a daily cold sponging of the body followed by brisk rubbing are recommended. Little, if anything, in the way of drugs should be employed for constipation.

Convulsions may occur as a complication in diarrhœa, and frequently result from improper feeding, congestion of the brain, affections of the ear, rickets, uræmic poisoning and the infectious fevers, such as measles, scarlet fever, or whooping-cough. They are occasionally due to reflex irritation from teething; the pricking of a pin, or the presence of worms may produce nervous excitability, and where other conditions tend this way convulsions may follow. The attacks occur more often during the first year of life, and may come on quite suddenly; or the onset may be gradual, restlessness with twitching and grinding of the teeth being a premonitory symptom. The hands stiffen first, and afterwards the whole body becomes rigid; the eyes are staring or rolled upward. In a few moments the muscles relax, and twitching or con-

vulsive movements are seen in the limbs and arms; gradually these cease and sleep follows. In bad cases the seizures may follow each other in rapid succession. If the physician is present, he usually gives chloroform during the attack; if the cause be over-distension of the stomach or indigestion, an emetic is given, and is followed by an enema. A warm bath is customary; this should be given with care, so as not to cause too severe a shock. The temperature of the bath should be 96° to 100° F.—not hotter; the warmth will relax the muscles and induce perspiration and sleep. The head should be kept cool by cold compresses or by means of an ice-cap. Any possible source of irritation should be searched for, and when found should be removed.

Meningitis is an inflammation of the meninges of the brain or spinal cord; it may come on gradually and insidiously, or develop suddenly with continuous convulsions. It usually comes on in the former manner, with symptoms of fretfulness, restlessness, intolerance of light or noise, headache and vomiting and, as the disease advances contraction of the pupils and convulsive attacks may occur. The bowels should be kept freely opened, perfect quiet enforced, the room darkened, and all causes of excitement kept away. Only liquid food at regular intervals should be given, and plenty of fresh air with thorough cleanliness is indispensable. Warm tub-baths are sometimes ordered.

Infantile paralysis (acute anterior poliomyelitis) usually occurs in children under three years of age. It begins usually with high fever and convulsions, which are followed in a day or two by a more or less marked loss of power and atrophy of the muscles. A

physician should be called at once. The treatment at first will probably be limited to keeping the child in bed, to reduction of the fever and the proper regulation of the bowels. After the acute stage is over massage and passive movements of the affected limb, plenty of light nourishing food and fresh air, are recommended. A nurse is often ordered to apply electricity for the purpose of giving a certain amount of exercise to the muscles, and thus keeping up their nutrition.

Incontinence of urine is of frequent occurrence, especially in nervous children. It may be met with in connection with diseases which are accompanied by other and more prominent symptoms, or may be due to an increased quantity or to too great an acidity of the urine, to weakness of the sphincter muscle, or to the presence of pin-worms in the rectum. The child should be placed under the care of a physician, and regular habits of urination should be formed; if he is old enough, he should be taught to exercise his will-power. He should not be allowed to drink much in the evening. He should always empty the bladder just before going to bed for the night, and should sleep with the foot of the bedstead elevated.

Chorea is a disease in which there are irregular movements produced by involuntary contractions of single muscles or groups of muscles. It is commonly spoken of as St. Vitus' dance. Young girls and boys of a highly nervous temperament develop it most frequently. Absolute freedom from excitement and worry should be provided for, besides the best of hygienic surroundings, the child being amused in a quiet way, and in all severe cases kept in bed. Nurses

should always know how to manage such cases, as they often have the care of the patient with only occasional visits from the physician, and a great deal depends upon proper nursing. In severe cases of chorea, where the child is losing much sleep and becoming exhausted, the application of the hot pack usually relieves the nervous strain and produces sleep.

Rickets, or *rachitis,* is a disease of childhood, characterized by deformities in the bones, owing to increased cell-growth in them, with a deficiency of lime-salts. Non-hygienic surroundings and improper food are the main causes, and the substitution of cleanliness, wholesome food, fresh air, and sunshine will effect more than drugs. The child is generally pale and delicate-looking. The head may be unusually large, and the changes in the shape of the long bones are often noticeable; the legs are apt to be more or less bowed, or the child may be knock-kneed. A most important point to remember is that deformities may often be prevented in the early stages if constant care is taken by the nurse in carrying and holding the child properly. The condition is most common among the children of the poor in crowded localities.

Croup among children occurs in two forms — the false or spasmodic, and the true membranous or diphtheritic croup. The spasmodic form is supposed to arise from spasmodic closure of the glottis; it comes on suddenly, and may be the result of exposure to damp and cold, of excitement, or of indigestion. This false croup is not dangerous, but the symptoms are alarming, especially when, as most frequently happens, the attack comes on during the night: the child wakens from a quiet sleep with a hoarse cough, dif-

ficulty of breathing, and the mother fears that suffocation is imminent, since the face sometimes becomes perfectly blue. The spasm ceases abruptly and the child goes to sleep, but the breathing continues to be croupy during the night. Sponges of flannel wrung out of hot water are first applied to the throat, and a hot bath or a mustard foot-bath is sometimes given. These simple measures will relax the spasm, although they may not relieve the croupous breathing, which, however, is not serious. Should warm applications fail, a moist air-tent may be improvised, (see p. 200). An emetic consisting of a drachm of the wine or syrup of ipecac, repeated every half hour till free vomiting occurs, and a simple enema, are generally very effective. The attack frequently comes on for three nights in succession, an hour or so earlier on each succeeding night. One should try to prevent an attack by taking precautionary measures during the day; thus the bowels should be freely opened with a dose of castor oil, only light forms of food should be given, and the child kept in a uniform temperature.

In *membranous laryngitis* a false membrane is formed in the larynx, and may thicken gradually until the passage is quite closed between the cords; in such cases, if the patient does not succeed in coughing up the obstructing material he is liable to die from asphyxia, and even where the membrane is not so extensive death may result from exhaustion. It is always well to consider this membrane as due to diphtheria, and to isolate the patient. The symptoms come on gradually with a wheezing sound from spasm of the glottis, and as the membrane accumulates there is evidence of depression throughout the whole sys-

tem. The temperature may range from 103° to 104° F. (although in some cases the patient may have very little or no fever), the pulse-rate may be increased, and the disease may terminate fatally after twenty-four or forty-eight hours. The air breathed should be moist; a steam kettle filled with lime-water may be kept boiling in the room, with the steam directed toward the mouth from a moderate distance. Careful attention to the diet is necessary: beef-juice and milk and stimulants, if the pulse indicate them, will be ordered, and it is usual to allow plenty of water to drink if the patient be thirsty. While waiting for the physician the nurse may make preparations for intubation or tracheotomy, either of which operations may be expected at this stage.

Eczema in children takes on various forms; the affection is an inflammatory disease of the skin. It may occur within a very short time after birth, and is sometimes the result of improper care on the part of the nurse. The flannel in which it is wrapped may be too irritating and rough for the tender, delicate skin of the child, or even a small amount of friction may produce chafing or redness. Again, the ointment or oils used may have been impure, or the child may have been kept too warm. Eczema may also be due to reflex irritation from the alimentary canal. Further, the fæces and urine are irritating, and unless the infant be properly bathed and dried an eczema will be sure to appear over the areas subjected to irritation. The eruption occurs chiefly in the folds of the neck, behind the ears, on the head, under the arms, about the buttocks, and in the groins. For such patients soap and water should not be used for bathing purposes,

as they are irritating, but some bland mucilaginous wash, such as thin starch-water, bran-water, a solution of bicarbonate of soda, or flax-seed tea, should be substituted, as these soothe the itching which is always present. On the scalp irritation may soon appear, unless care is taken to remove all of the vernix caseosa. As a rule, however, gentle, careful cleaning, preceded by a good oiling, will soften and remove it. Beside thorough cleanliness, whatever treatment is prescribed by the physician should be faithfully carried out.

A rash appearing on different parts of the child's body may, however, be due not to eczema, but to one of the eruptive infectious diseases that occur in childhood more frequently than in adults, such as measles, scarlet fever, rubella, and chicken-pox.

Measles may occur at any age, but is most frequent in childhood; it is an acute, highly contagious disease, which may be divided into three stages—viz., those of invasion, eruption, and desquamation, respectively. The average period of incubation (*i. e.*, the time which elapses between exposure to contagion and the onset of the first symptoms) is from ten to fourteen days or even longer. The stage of invasion sets in with coryza, simulating somewhat an attack of influenza, the running at the eyes and nose being accompanied by a hacking cough, fever, headache, and loss of appetite. The fever is highest on the third or fourth day, reaching 105° F. or more, and the reddish eruption appears usually on the morning of the fourth day, first upon the forehead, then upon the neck and chest, until finally the face and entire body are covered with it. At first small red spots appear, which increase in size, and finally run together, and the papules or

little elevations may be felt distinctly on passing the fingers over the skin. After two days the eruption begins to fade, the fever abates, and the catarrhal symptoms disappear, but the cough may continue for some days. As the eruption and fever decline desquamation or peeling off of the skin in fine branny scales begins. The child should be kept in bed on milk, or on light diet if there be little fever, the bowels should be made to move regularly, the temperature of the room should be kept at 68° F., and the ventilation looked after; exposure to sudden changes in temperature should be guarded against. If the rash does not come out well, hot drinks or a hot bath and wrapping the child in flannel may hasten its appearance. The room should be moderately dark for the first few days, or the eyes should be protected from the light, as there is generally marked photophobia. When desquamation begins, the whole body may be smeared with vaseline or an oil bath may be given daily, usually in the evening, and a warm-water bath in the morning; usually some antiseptic is mixed with the oil or ointment. The complications in measles are often more serious than the disease itself; of these pneumonia or broncho-pneumonia is the most common and perhaps the most dangerous; bronchitis is also very frequent, and some degree of conjunctivitis is nearly always present. Isolation is usually kept up for a week after the peeling has ceased, and the clothing and the room must afterwards be disinfected as in other infectious diseases.

Rubella (German measles) is a contagious disease which spreads rapidly. The period of incubation is about ten days or a little longer. The initial symptoms

are coryza, chilliness, pains in the back and legs, and some fever. The eruption appears first on the face and chest, and very soon spreads over the body. In appearance it resembles that of measles; after two or three days it fades away. The disease is usually mild, and the giving of a light diet, keeping the bowels active, and confinement to the house in a room of a warm equable temperature for about a week will be all that is necessary.

Parotitis, or mumps, is an inflammation of both, more rarely of one of the parotid glands, involving also the surrounding connective tissue; it is an infectious and a contagious disease. The period of incubation varies from eight to fourteen days or more. The onset is usually marked with a chill, malaise, headache, and some rise of temperature; in nervous children convulsions often occur. The disease reaches its height in from four to five days, after which the pain and swelling gradually subside. Warm fomentations may be applied to relieve the pain, the bowels should be kept open, and soft non-stimulating food given. The ventilation should be good and the room kept at an even temperature. It is best to keep the child quiet. Isolation should last three or four weeks. This specific parotitis differs from that seen sometimes as a complication of typhoid fever; in the latter suppuration is the rule.

Whooping-cough or *pertussis* is an infectious disease beginning with a catarrh of the air-passages, just like an ordinary cold. The incubation period varies from seven to ten days. There is some fever, wheezing, and a short dry cough; at the end of eight or ten days the cough becomes worse and is associated with the

characteristic "whooping sound"; this whoop is really a prolonged inspiration occurring at the end of a paroxysm of coughing; the expirations are short and spasmodic. At the end of a fit of coughing a frothy mucus is expectorated. Vomiting is very common and often seriously interferes with the nutrition of the patient. This stage lasts from six weeks to three months, or even longer. The child should be kept away from other children, and in bed during the first stage and while the fever lasts. Plenty of fresh air should be provided day and night. Inhalations of steam are sometimes prescribed for the cough, while easily-digested, nourishing food is given throughout the whole course of the illness. In the later stages a change of air is advisable, as it often shortens the duration of the attack.

A high temperature and a rapid pulse are not considered such serious symptoms in children as in adults. The temperature in children should always be taken by the rectum, and the pulse during sleep will always be more reliable.

In all of these diseases peculiar to children the nursing forms a most important part, and upon the skill, intelligence and sympathy of the nurse the comfort and well-being of the little patient largely depend.

CHAPTER XXVI.

OBSTETRICS.—PREGNANCY.—SYMPTOMS AND PHYSICAL SIGNS.—DEVELOPMENT OF THE FOETUS.—ABORTION.—MISCARRIAGE.—PREMATURE LABOR.—CARE OF THE PATIENT BEFORE, DURING, AND AFTER LABOR.—CARE OF THE BREASTS.—CARE OF THE CHILD.—THE PUERPERAL STATE.

The impregnation of the ovum, which is to result finally in the formation of a new being, constitutes what is called conception. The ovum lodges in the uterus and, remaining there, gradually develops until the fœtus matures, when it is expelled, under normal conditions, in the shape of a well-formed infant. In the beginning the new organism is called the embryo, after the fourth month the fœtus. The symptoms and signs of pregnancy are numerous. Among the first to appear after cessation of the menses are nausea and vomiting (morning sickness), which, however, are generally met with only in the early months of pregnancy. In some cases there may be only slight nausea on rising, which does not result in actual vomiting, and as a rule the nausea and vomiting of pregnancy amount to nothing more than an inconvenience, but occasionally this symptom is aggravated and may become of grave import. A few weeks after conception there can be noticed some enlargement of the breasts and a darkening of the areolæ; the breasts become fuller, and the woman often has a throbbing sensation in them; the superficial veins become distended.

The changes in the size of the abdomen are dependent upon the progressive enlargement of the uterus, which also gives valuable indications as to the stage of pregnancy that has been reached in any particular case. The uterus at first is low in the pelvis; at some time during the fourth month the fundus is on a level with the brim of the pelvis; by the end of the fifth month it has risen halfway to the umbilicus; and at the end of the sixth is on a level with it. At the end of the seventh month the fundus is midway between the umbilicus and the tip of the sternum; at the end of the eighth month it reaches to the xiphoid cartilage; finally, during the ninth month the uterus again sinks a little in the abdomen. Between the eighteenth and the twentieth week *quickening* is first felt; that is, the mother first becomes conscious of the movements of the child. From the fifth month on, the *foetal heart* may be distinctly heard on listening with the stethoscope; the sound resembles the ticking of a watch under a pillow. The rate of pulsation of the fœtal heart varies from 130 to 160 beats per minute. Attempts have been made to determine the sex of the child before birth by the frequency of the heart-beats, the pulse being generally a little slower in larger children, who are more commonly males, but no trustworthy diagnosis can be made by this method. Changes also take place throughout the whole body of the pregnant woman; the heart, having more work to do, enlarges a little, and there is a general increase in tension in the arterial system. Sometimes there is swelling of the thyroid gland.

The obstetrician is often able to diagnose pregnancy very early by a vaginal examination. The vagina as

early as the third week assumes a bluish tint, owing to the dilatation of the veins, and, what is more important, the cervix of the uterus becomes softened. In women who have never been pregnant the cervix feels as hard and firm as the tip of one's nose, but at the end of the first month of pregnancy it is much softer. There are often marked digestive changes: the appetite may be capricious, and there may be a craving for particular kinds of food; the salivary secretion is increased. Wherever pigment is found normally, it is increased in amount in pregnancy; thus, there is often a deep-brown line running from the umbilicus to the pubes, and the face nearly always shows alterations in tint. Occasionally the latter is very much pigmented, and we have the so-called *masque des femmes enceintes.* The nervous system may be influenced in a striking manner: sometimes nervous, irritable women become quiet and amiable, while those who have been even-tempered and genial become cross and excitable. The quantity of urine is increased; there may be functional disturbances, such as frequent, painful, or involuntary micturition. Albumin is sometimes present—a sign which always makes a physician anxious; the bowels may be constipated. Headache, neuralgia, hæmorrhoids, varicose veins, and insomnia are not uncommon. Chorea is a dangerous complication. The patient should be under the observation of an obstetrician from the beginning. A specimen of urine should be sent to him for examination every ten days or at least once a fortnight.

The average duration of pregnancy is 280 days, or about nine calendar months. The probable date of confinement may be calculated in two or three ways,

but the one considered the most accurate is to count back three calendar months from the date of the appearance of the last menses and add seven days. This will give us the month and approximately the day. In first pregnancies—or, as we say, in the case of primiparæ—labor is apt to begin a week earlier than this, as the uterus is not so tolerant of distention as it may afterward be in later pregnancies.

Ballottement (from the French *ballotter,* to toss up like a ball) is another means of diagnosing pregnancy. The examining finger is placed in the vagina, while the other hand presses slightly on the abdomen; the fœtus is poised on the finger in the vagina, and then tossed up till it strikes the outside hand, after which it will return to its former position with a gentle tap. This can generally be appreciated at any time after the fourth month; the sign, which is known as *internal ballottement,* may be absent if the amount of amniotic fluid be small; *external ballottement* is a sign of less value.

The fœtus receives its nourishment from the mother through the placental vessels. The arrangement for the interchange of substances in the placenta between mother and child is most wonderful. The uterine and placental vessels fit into one another like fingers into a glove, and so thin is the membrane between the two that nutrient substances coming from the mother and waste substances from the child returning to the mother pass through easily.

The development of the fœtus begins, as we have said, with the impregnation of the ovum, which entering the uterus, becomes attached to its mucous membrane, usually on the upper part of the anterior or posterior

uterine wall, but rarely at the fundus. At the point of junction of ovum and uterine mucosa the placenta is formed. The fœtus becomes enclosed in several membranes, the formation of which is too complicated to be discussed here, but which will be found fully described in any treatise on embryology.

The membrane nearest to the fœtus, and which contains the fluid in which the latter is suspended, is known as the amnion, the fluid being called the amniotic fluid; while the external coat is designated as the chorion. The umbilical cord contains the blood-vessels which run between the fœtus and placenta. A fully formed placenta occupies about one-third of the surface of the mucous membrane of the uterus. It is round in form, from six to seven inches in diameter, and about one inch thick; the surface next the fœtus is covered by a smooth membrane, the amnion, while the uterine or maternal surface is rougher, and is divided by shallow furrows into fifteen or twenty smaller areas, which are known as cotyledons. The placenta is connected with the fœtus by the vessels of the umbilical cord, and the fœtal vessels communicate with the uterine vessels of the mother—not indeed directly, for, as we said, the two bloods never mix. The placenta is the organ by means of which the respiratory, excretory, and nutritive functions of the fœtus are carried on; the umbilical cord is attached to the placenta at one end and to the umbilicus or navel of the child at the other. It is from sixteen to twenty inches long and about half an inch in diameter. It is covered by the amnion, and is mainly made up of a peculiar tissue called *Wharton's jelly;* it contains the umbilical vein and the two umbilical arteries; the vein

carries the blood from the placenta to the fœtus, and the arteries return it.

The terms used for an uncompleted pregnancy are *abortion, miscarriage,* and *premature labor.* When the ovum is expelled at any time during the first three months of pregnancy, we say that an abortion has taken place; when the expulsion occurs at any time between the third and seventh months (*i. e* before the child is viable), we call it a miscarriage; a premature labor is one which occurs between the seventh and the end of the ninth month.

The care to be given in nursing a case of abortion is, if possible, even greater than that required in one of normal labor: the latter is a natural, the former a pathological process. There will be more danger of hæmorrhage and more shock to the nervous system. The patient must be kept absolutely quiet, and much attention must be paid to diet and cleanliness. The symptoms of abortion are pain and hæmorrhage; the latter may be excessive, owing to a partial separation of the placenta from the walls of the uterus. Besides, it is always more difficult for the uterus to regain its normal condition after abortion than after labor at term.

Treatment of Abortion.—In a case of threatened abortion the doctor should be sent for at once, but if the symptoms are slight, absolute rest in bed and the avoidance of all mental excitement may be the only treatment necessary. If, however, the abortion seems inevitable and there is much hæmorrhage, the patient is to be kept perfectly quiet, with the foot of the bedstead elevated, and in an emergency the nurse may be obliged to tampon the vagina. If abortion takes place

before the arrival of the doctor, all discharges must be saved in a covered basin for his inspection.

The rupture of the membranes some time prior to labor may be considered as an accident. The patient should be put to bed, kept perfectly quiet, and the doctor notified.

Ante-partum hemorrhages.—Any bleeding from the genital canal occurring during pregnancy is a sure sign that all is not going on well and the physician should be notified at once. Practically all ante-partum hæmorrhages are due to a partial or complete separation of the placenta from its attachment to the uterine wall. This accident occasionally occurs when the placenta occupies a normal position, but is most frequent when it has been implanted in the neighborhood of the internal os—*placenta praevia.* The most characteristic symptom is hæmorrhage which usually does not occur till about the seventh month, although abortions at an earlier period are undoubtedly often due to this condition. The complication is a very dangerous one. If the danger is imminent the nurse may proceed to pack the vagina before the arrival of the physician.

Convulsions sometimes occur during the pregnant state, and too often are the indications of uræmic poisoning. All, and more particularly nervous patients, should be allowed plenty of light, nourishing food and gentle outdoor exercise, and be kept as free as possible from all worry and excitement. An abundance of pure fresh air is needed, and small over-heated rooms, confinement in-doors and crowded assemblages are to be avoided. The food should be nutritious and easily digested. Pastry or sweets should be restricted or

entirely forbidden as they tend to cause acidity, flatulence and gastric distress. Water should be taken freely; the bowels should be opened daily. The daily bath should be warm but not hot, as the latter is liable to stimulate the uterus too much and thus bring on labor prematurely. In the later months of pregnancy the patient should give even more attention to details in the care of herself. Rest in the recumbent position for a certain time each day is necessary. As a support a long thin flannel binder should be firmly wound from below upward about the abdomen. For œdema of the legs flannel bandages are sometimes very useful. Plenty of sleep is necessary and all excitement is to be avoided.

Certain symptoms precede the onset of labor, beginning about two weeks or ten days previous to it, when the fœtus descends somewhat into the pelvic cavity; the pressure is now removed from the thoracic organs to those of the lower abdomen, and may cause frequent micturition, constipation or diarrhœa; œdema of the external genitalia and of the lower extremities is sometimes very marked, owing to the pressure on the pelvic veins. The woman often complains of a feeling of numbness, neuralgic pains, or cramps in the extremities and difficulty in walking. The cervix secretes a large quantity of mucus, which lubricates the surrounding structures and prepares them for the expulsion of the head. The vagina becomes softer; rhythmical uterine contractions come on in the evenings about 6 P. M. and last until midnight. These are not so noticeable in primiparæ as in multiparæ.

Labor is divided into three stages, which practically are not sharply separable in normal cases. The first

stage comprises the changes which bring about complete dilatation of the cervix; during the second stage the child, and during the third the placenta is delivered.

The dilatation of the cervix is a gradual process: when the pains are first felt it may be possible only to introduce the tip of the finger through the os, but with each succeeding pain the bag of waters is pressed down and produces gradual and even dilatation. When a pain subsides, the bag tends to recede into the uterus, but with each subsequent contraction it continues to press upon the cervix until the tissues are fully relaxed. During this process the surrounding blood-vessels become congested, and the cervix may be slightly lacerated, so that the discharge is tinged with blood. When the external os is three and one-half inches in diameter, it is time for the membranes to rupture. The rupture should occur spontaneously, but occasionally it must be artificially produced by means of a grooved director or a sterilized darning needle. After this the head descends into the vagina, a portion of the fluid remaining behind; as the head goes back during the intervals between the pains, other portions of the waters come away. This process continues, the pains gradually becoming more vigorous, until the waters are expelled. In rare instances the head may be born without rupture of the membranes, and the child is then said to have been "born with a caul." The uterus, assisted by the abdominal muscles, continuing to contract, causes the child to descend, dilating the parts as it goes. Finally, the head comes down upon the perineum, and begins to dilate the vulval outlet. At this stage a certain amount of support should be given to the perineum during a

pain, as the head presses upon it, stretching it each time a little more. While the head is being born the perineum should be supported by the hand, while at the same time the head is pushed upward, thus relieving the strain and lessening the danger of rupture of the perineum, which occurs in from 20 to 40 per cent. of all women pregnant for the first time.

The placental or third stage lasts from the time that the child is born until the placenta is delivered; during this period the woman may complain of some slight disturbance, such as chilly sensations, and after the removal of the child the filling up of the blood-vessels of the abdomen may cause headache or even syncope. Before the placental pains come on there is a period of quiet of from five to fifteen minutes; then contractions begin again, and the delivery of the placenta takes place. In a normal delivery the placenta descends folded vertically in the axis of the womb through the vagina; after thirty minutes, if uterine contractions do not take place of their own accord, it may be necessary to excite them; this may be done by gentle friction over the fundus. Five or six gentle motions will be usually enough; if after gentle manipulation the uterine walls do not contract, the obstetrician usually expels the placenta by what is called "Credé's method." The uterus is firmly grasped in the left hand, so that an even pressure can be exerted from all sides and from above upon the body, with the result of actually squeezing out its contents. The best plan is to stimulate the fundus gently by kneading it until a contraction is felt, and then express immediately. Immediately after the birth of the child, the uterus should be felt as a firm, round, hard mass, reaching midway

between the symphysis pubis and umbilicus. The placenta usually leaves the uterus in from ten to twenty minutes after the birth of the child and enters the vagina, whence it is expelled by the action of the abdominal muscles, which may occur in a few minutes, or not for hours.

The passage of the placenta from the uterus to the vagina is indicated by the fundus of the uterus rising up about two inches above its previous position; when this occurs the placenta should be pushed out of the vagina, the uterus being used as a piston.

Traction on the umbilical cord should never be made under any circumstances by a nurse. As the placenta is expelled, the membranes may be caught in the os; even now no traction should be made, but one twists the membranes gently to prevent tearing, and waits a moment or two until the spasm of the cervix is over, when everything will come away.

After the delivery of the placenta the uterus presents at the placental site a large raw surface with open bleeding vessels, from which there may be hæmorrhage if the uterus does not contract well. After the delivery of the child it is essential that one hand be kept always over the uterus until some time after the placenta is born. Occasionally the doctor will entrust the nurse with this duty. Any relaxation of the uterine walls must be carefully watched, as there is no danger of hæmorrhage from the torn placental vessels so long as the uterus keeps well contracted.

The numerous lacerations, small and large, of the uterus, cervix, vagina, and perineum make the puerperal state dangerous, since these are so many open pathways for infection with septic material. For this

reason the same precautions must be taken in treating a patient in the puerperal state as in caring for any open wound; in other words, the same rigid antiseptic measures should be enforced as in cases of operative surgery.

The nurse should never examine vaginally unless told to do so by the physician in charge of the case. For, if she does, no matter how carefully she may disinfect her hands, and the patient has a rise of temperature during the puerperium, she is sure to be accused of infecting the patient, even though the doctor may have examined with dirty hands. As an obstetrical case must always be regarded as being strictly surgical in character it is always understood that no nurse who has been recently exposed to any source of infection, such as a contagious disease or has been taking care of a septic case shall ever undertake the care of a woman in labor. In fact because her case is surgical such a patient should always be cared for in a maternity hospital where aseptic precautions can be properly carried out. There are many other reasons why she is much better off in a good institution, and every effort should be made to induce the women of the poorer classes to avoid the risks they incur when confined in their own homes.

The average duration of labor in primiparæ is seventeen hours, in multiparæ twelve hours. The second stage of labor in the former usually takes two hours, and in the latter one hour. Labor pains usually begin in the evening, and the majority of births take place between midnight and 3 A. M.

In primiparous women the doctor should be sent for about six hours after the onset of the pains; while in

multiparous women he should be sent for as soon as the pains begin to come on at regular intervals.

When a nurse is called to assist at a confinement, her first duty is to see that the necessary articles are ready at hand, that the patient is prepared, and that the room and bed are arranged; she must also make sure that everything has been provided for the reception of the child. There must be plenty of sterilized hot and cold water, five basins, preferably of china or granite-ware, soap and nail-brushes, 100 Bernay's bichloride tablets (four to a pint making a 1-1000 solution), 4 oz. of permanganate of potash, 8 oz. of oxalic acid, 4 oz. of boric acid, sterilized vaseline, one dozen sterilized towels, one sterilized sheet, a sterilized bobbin for tying the cord, plenty of clean towels, a bath thermometer, a rubber sheet, a small old blanket or a piece of an old blanket, a large square of old muslin or linen, blunt scissors, ice and a douche-pan. A Davidson's syringe, ergot, chloroform and whiskey may also be required, but the doctor usually provides these.

The labor-bed should be of medium height, single, and situated so that it is accessible from both sides; a hair mattress is the best, and it should not be hollowed out in the middle; a feather bed should never be used. The mattress is to be protected with a large rubber sheet, and over this a cotton or linen sheet is placed; next comes a draw-sheet or large sheet folded once, which should be kept smooth and in position by means of safety-pins; then over this are placed a second rubber sheet and draw-sheet, which may be removed after the confinement with little difficulty, leaving the patient in a dry, comfortable bed. In addition

to these sheets, pads may be prepared to absorb the discharges: the most convenient size is about two feet square and two inches thick; they may be made of either bran, sawdust, or absorbent cotton, the last being rather more expensive. The cotton may be covered with cheese-cloth; soft old linen or muslin does very well for the bran-pads, the bran being prevented from becoming lumpy by loosely quilting the pad. These pads may be rendered perfectly clean by sterilization in an Arnold sterilizer for half an hour, or by baking in the oven. When used properly they will absorb all discharges, and may afterward be burned. These precautions can, however, be rendered unnecessary by the use of the Kelly obstetrical pad, which prevents any soiling of the bed-linen. In private practice this is usually provided by the obstetrician.

The nurse should next prepare the patient by giving her a thorough bath, brushing the hair and braiding it into two braids; the bowels are to be emptied by giving a simple enema, and if the urine can not be voided the patient should be catheterized. The external parts should be carefully bathed with soap and water, and then with a 1-1000 bichloride solution. The patient is best clothed in a clean night-dress and enveloped in a warm wrapper. Light, unstimulating, and easily digestible food is given, and she is allowed to move about the room during the first stage, unless there should be a previous history of precipitate labor. A record of the antepartum temperature, pulse, respiration and the time when labor began should be charted. For the first few days after labor the temperature, pulse, and respiration are taken three times a day and a record is kept of the treatment and symptoms.

The first stage of labor may occupy from 12 to 14 hours. During the period the child should be frequently palpated through the abdominal walls of the mother, and the fœtal heart counted, as marked changes in it frequently indicate that the child is in danger.

Owing to the danger of infection, vaginal examinations should be made as rarely as possible, and then only by the doctor; at least 95 per cent. of all cases can be conducted by palpation through the abdominal walls.

The only information which cannot be gained by palpation is the degree of dilatation of the cervix, and this can be told in great part by the character of the cry to which the patient gives expression.

Before a vaginal examination is made the external genitalia should be again washed with soap and hot water, and then with a 1-1000 bichloride solution, being afterwards cooled with a towel soaked in the same solution.

The hands and forearms of the examiner should then then be carefully disinfected according to the following rules: Use soap, hot water and nail brush for at least five minutes, or until macroscopically clean; soak in hot saturated solution of permanganate, wash off in hot saturated solution of oxalic acid, and then soak for three minutes in a 1-1000 bichloride solution, the hand going wet from the solution to the vagina.

A sterilized towel is then placed beneath the buttocks of the patient, and the examination made under the guidance of the eye, the labia being spread apart by the other hand, so that the examining finger may be introduced directly into the vagina, without coming

in contact with the external genitalia. The examining finger is introduced into the vagina during an interval between the pains, as the membranes are then lax and the presenting part of the fœtus can be defined more easily; but if one wishes to determine the extent of the dilatation of the os, it is well to examine also during a pain, as the outline can best be felt when the membranes are pressed against it. Every examination should be made gently and carefully in order not to rupture the membranes. The patient should be cautioned not to bear down during the first stage, as this only exhausts her without doing any good. When the os is fully dilated and the pains begin to follow each other in rapid succession, she should be put to bed, a large sterilized sheet having been previously pinned about the hips, while the night-dress is folded neatly and smoothly up under the arms and fastened in place with safety pins. This prevents any soiling of the night-dress, and the necessity of changing it when the labor is over may thus be avoided.

When in bed the patient usually lies either on her side or on her back, but preference is given to the dorsal position.

The expulsion of the head causes the most pain, and as long as it is advancing satisfactorily it is not considered wise to interfere. At this stage the patient is instructed to bear down. A long strap or towel fastened to the foot of the bed for her to pull on is of material assistance. If, however, the head has been down upon the perineum for two hours and no progress has been made, the physician usually takes steps to terminate the labor. It is in this stage, when the pains are too strong, that chloroform is administered

in small doses, since the use of it calms the patient, weakens the pains, and prevents the too sudden expulsion of the head. Chloroform should never be given in the third stage of labor.

The most desirable presentation is that of the head. Any part of the body may present, and it is particularly important that the obstetrician see the case early, since sometimes a faulty position may be rectified before rupture of the membranes has taken place—a thing which may be impossible later. We are speaking here almost altogether of a normal labor, in which the occiput is the presenting part, and shall not refer to the cases in which another part, such as the face, breech, foot, arm, or shoulder, presents. These presentations will be found fully described in the textbooks on midwifery, and it is important that a nurse who attends labor cases should make herself conversant with many more facts and details about the subject.

If the cord is prolapsed, efforts should be made to push it back carefully above the head, as there is danger that it may be compressed during the passage of the head through the vulva, and thus the supply of oxygen to the child be cut off. The nurse's hands having been carefully disinfected the patient should be put in the knee-breast position and the cord then pushed up beyond the head into the uterus. The physician should be called promptly. After the head is born there is usually a slightly longer interval before the next pain; the nurse immediately wipes out the eyes and mouth of the child with pledgets of absorbent cotton soaked in a saturated solution of boric acid. The shoulders are born at the next pain, and with

them, as a rule, the whole body. The shoulders in their passage, perhaps almost as frequently as the head, produce laceration of the perineum.

As soon as it is born the child is usually placed on its right side; the old idea was that this assisted in the closure of the foramen ovale. If the child does not cry or make some sign of life at once, it should be slightly shaken and a finger inserted into its mouth to remove any accumulation of mucus. A gentle slap on the back may excite inspiration, or a few drops of cold water sprinkled over it briskly with the fingers will often cause the child to give a cry. If these means are not successful, tickling the ribs in the region of the diaphragm acts as a strong stimulant to the respiratory centre, or a few drops of whiskey or brandy rubbed into the skin will generally be found efficacious. If, however, they fail, artificial respiration must be instituted.

Unless the child shows signs of asphyxia, the cord should not be cut until pulsation in it has ceased, or at any rate not until the child has cried. The cord should be tied in two places, the first ligature being placed about one inch from the child's abdomen, and the second about two inches farther away; it is then divided with scissors at a point midway between the two. Sometimes it is tied in only one place, but the second ligature should always be used as a precautionary measure to prevent hæmorrhage from the placenta, or soiling of the bed. Moreover in case there were a second child still in the uterus the loss of blood might otherwise be fatal to it. The cord should be examined for hæmorrhage about four times during the first hour or two.

The child should be at once wrapped in a large square of old muslin, and again in a flannel blanket, and laid in a warm place until the mother has been attended to; she should receive the first care unless there is difficulty with the child's breathing. After the birth of the child the hand should be applied to the fundus of the uterus and kept there continuously. As long as it remains firm and hard there is no danger of hæmorrhage; but if at any time it tends to relax, becoming soft and flaccid, it should be kneaded vigorously, so as to stimulate uterine contractions. But as long as the uterus is firm and hard, kneading is not only unnecessary, but absolutely harmful, as it interferes with the normal separation of the placenta from the uterine wall. For half an hour after the expulsion of the placenta the condition of the uterus should be watched in the same way. If it is necessary to give ergot at all, this is the time, but this drug should never be given until after the delivery of the placenta. The latter should be kept in a covered dish until the physician has had time to inspect it. If any portion of the placenta is missing, the physician will seek to remove it, as retained portions are liable to decompose in the uterus and be a direct source of danger. The safest way to dispose of the placenta is to wrap it in paper and burn it; or it may be buried.

The external genitalia should now be thoroughly cleansed with a 1-1000 bichloride solution; a sterilized napkin made of absorbent cotton and gauze is put on and the soiled bedding removed. The dressing is changed once in three hours for the first twenty-four hours; after that once every four or six hours is all that is necessary. *The nurse should remember never*

to do this dressing, catheterize her patient, or care for her after a movement of the bowels, without first thoroughly cleansing her own hands and taking every antiseptic precaution possible. If a binder is used, the most comfortable will be a Scultetus bandage, as any degree of pressure desired may be made with it; it is held in place with the perineal straps. In lieu of the Scultetus an ordinary roller towel, pinned on firmly with safety pins, can be made to answer every purpose. Sometimes extra pressure is made over the uterus by means of a folded towel placed under the bandage. The use of this depends, however, entirely upon the wishes of the physician: many do not employ such a pad, owing to the fact that it frequently becomes displaced, in which case it does more harm than good. After the patient has been bathed and cared for, she should be kept very quiet; no talking should be allowed, and visitors, even members of the family, should not be admitted to see her until after she has had some hours of rest. A constant watch should be kept upon the pulse, which at this time will have fallen to or even below its normal level. An unusually rapid pulse, such as one of 100 or more per minute, unless it can be accounted for by some other known cause, may be taken as indicating the occurrence of hæmorrhage. These "post-partum hæmorrhages" form one of the greatest dangers to be encountered after the birth of the child. The hæmorrhage may come on quite unexpectedly, and it is necessary to be always ready to meet this emergency and to take prompt measures to check the bleeding. The means by which nature endeavors to prevent post-partum hæmorrhages are contraction and

retraction of the uterus; the sinuses are thus closed and the venous blood-vessels are occluded.

The best thing to do, and the one which can be done most quickly, if hæmorrhage occurs, is to induce contractions of the uterus by grasping the fundus and employing a firm but gentle kneading, pressing downward; the foot of the bedstead is to be elevated, and some form of ergot may be given hypodermically; ice may be introduced into the vagina or very hot douches given, and the patient should be kept quiet. If these procedures fail, the hand and arm should be sterilized and introduced into the uterus, and the blood-clots removed; at the same time stimulation of the internal surface of the uterus with the finger-tips usually causes immediate contraction; the danger in doing this is that infectious material may be introduced unless the hand is rendered surgically clean. Perhaps the safest and most effectual method is to inject very hot water (120° F.) through a long douche-nozzle directly into the uterine cavity. Sometimes astringents may be introduced in the form of lemon-juice, or vinegar, which can always be procured. This emergency, perhaps more than any other, requires presence of mind and prompt action, and no time should be lost in making every effort to control the hæmorrhage. After we have been successful in producing contraction of the uterus, a rubber bag of cold water may be placed on the abdomen above the symphysis pubis to prevent subsequent relaxation. Cerebral anæmia and faintness from the enormous loss of blood may follow such a hæmorrhage. The symptoms and treatment are the same as those given when discussing hæmorrhage as a surgical emergency.

The *puerperium* begins as soon as the placenta is delivered. Marked changes must take place in the uterus before it can return to its ordinary quiescent condition. Immediately after labor there is a period of comfort and relief, which may be followed by a post-partum chill of more or less intensity and of shorter or longer duration; this is not of very great importance, as after the birth of the head evaporation from the skin and lungs takes place, producing chilly feelings, which soon disappear after the patient has been made clean and comfortable. The temperature of multiparous patients may rise from 1 to 1½° F. in the puerperal state, and there may be a temperature of 99.5° F. without the case being abnormal. This elevation is supposed to be due to organic disturbances which take place in the uterus, lacerations of the cervix or vagina, or nervous influences. The pulse falls after labor, ranging between 60 and 70, and on the third day may go even as low as 40. Frequently this condition is associated with diminished arterial tension, but its cause is imperfectly understood.

The skin, which is a most active excretory organ, is constantly exposed to sudden changes of heat and cold. It is best not to cover the patient too warmly, but she should never be exposed to draughts, particularly if she be a nervous woman. The urine will be abundant, and not infrequently a trace of sugar appears in it. If the milk in the breasts is used up as rapidly as it forms, the sugar disappears. Retention of urine is a very common occurrence after labor, and is due to the previous overstretching of the bladder, and also to a want of elasticity in the abdominal muscles, which fail to assist the organ in its action. The loss of the contents

of the uterus makes the entire weight of the body less by one-twelfth than it was before.

Involution, or the process by which the uterus returns to its normal condition, begins with the after-pains and continues for from six to eight weeks. The change is gradual, and the normal size and condition are slowly attained, fatty degeneration of the muscular fibres taking place. As a result there is a considerable decrease in the weight of the uterus. The cervix quickly regains its normal size; at first it is soft and flabby, but two weeks after labor it should be about normal. The vagina is at first smooth and relaxed; by the third week it becomes much smaller, the change being more marked near the outlet than internally.

When involution is incomplete and the uterus remains larger than it ought to be, we have the condition termed "subinvolution." This may often be traced to getting up too early after labor, and is a frequent source of trouble to women who have borne children.

After-pains are due to contractions of the uterus, and resemble somewhat labor-pains. They cause the expulsion of blood-clots, and usually continue from one to four days. If labor is of short duration, the after-pains are intense and prolonged, and *vice versa;* in multiparæ they are apt to be more severe than in primiparæ. If they trouble the patient too much, they may have to be controlled by small doses of morphin.

By the *lochia* we mean the discharges from the uterus and soft parts after labor. At first these discharges are mixed with blood (*lochia rubra*), and contain dark coagula, mucus, shreds of placenta, and pieces of membrane. From the end of the third to the sixth

day they are paler in color (*lochia serosa*); they contain less blood and more serum, and epithelial cells from the cervix and vagina, besides portions of membrane. The lochia after this assume a yellow-greenish color and contain pus and fatty cells, with a small quantity of blood. By the fourth day bacteria are plentiful and the discharges have a decided odor. The lochia vary in amount in different individuals; in those who menstruate freely and do not nurse their children they are usually copious.

The breasts on the third day are frequently swollen and very sensitive to the touch. Sometimes swelling and tenderness in the glands of the axillæ, with chilly sensations and elevation of temperature, are noted. This was formerly thought to be a physiological process, and was called "milk fever," but is now recognized as being due to some form of infection. The colostrum is the first milk secreted; as it comes from the breasts this is a semi-opaque fluid which contains a large quantity of sugar and organic salts. It coagulates on boiling and is said to have a laxative quality, driving out of the intestines of the child the meconium or waste material which they contain at birth.

The characteristic symptoms of the puerperal state are, then, enlargement of the breasts with well-marked areolæ; the uterus is enlarged; the vagina and vulva are swollen and œdematous; there is a lochial discharge, and as a rule more or less laceration of the cervix. If, after the first eight or twelve hours, the patient has not passed any urine and other means have failed, the catheter must be employed, absolute cleanliness of the parts being observed. The diet at first should consist of liquid, unstimulating food, given in

small quantities and at frequent intervals. If the baby is not to be nursed the amount of liquid is restricted. On the third day light diet, such as boiled eggs and milk-toast or custard, may be given, and to this may gradually be added chops and cooked fruits, as the latter will aid in keeping the bowels regular. If there be any tendency to constipation (and this is usually the case), the bowels should be opened by a simple or a glycerine enema or by one or more doses of the compound liquorice powder, about 2 drachms, repeated, if necessary, after three or four hours; or half a glass of Hunyadi Janos water may be given, or half an ounce of castor oil.

The nursing of the child should be begun as soon as the mother has rested and recovered from the exhaustion, as the stimulation of the breasts by acting reflexly helps to bring on uterine contractions. The breasts before and after confinement should have special attention: they are to be bathed with alcohol and boric acid night and morning, during the two or three months previous to labor, in order to harden the skin. If the nipples are very sensitive, they may be protected with glass-bell nipple-shields. Before touching the breasts antiseptic precautions should be observed with the hands, and the nipple should be carefully bathed, before and after every nursing of the child, with a 5 per cent. solution of boric acid, with which the child's mouth should also be washed out before and after feeding. The patient should be warned to handle her breasts herself as little as possible and only when her hands are quite clean, as there is always danger of introducing foreign material through the nipple opening, or, if there should be a fissure or crack

on the nipple, infection may take place through it—an accident that too often results in an abscess of the breast. A crack or excoriation should be bathed with a 5 per cent. boric acid solution, then painted with a 2 per cent. solution of nitrate of silver and afterwards with the white of egg. If the breasts are very full and hard, the quantity of milk secreted may be reduced by means of a breast bandage applied with even pressure. Care should be taken to keep the breasts soft and pliable by not allowing the deeper glands to remain unemptied.

The lying-in period usually lasts until after the lochia have stopped; by this time no pain is felt in the back and the patient is not easily exhausted. This takes from ten to fifteen days, or even longer. During the first ten days the patient should lie down all the while. Visitors should be admitted only by permission of the physician and never more than one at a time. The hygienic arrangements and care of the room must be as perfect as possible.

Some of the suspicious symptoms during the puerperal state are a rise of temperature, a rapid pulse, a flushed face, a chill, pain and tenderness of the abdomen, an abnormal increase or decrease of the lochia, hæmorrhage, or, finally, an offensive odor of the discharges. At each change of the napkin the amount of the lochia, their color and odor, should always be noted, and if the discharge presents any unusual appearance, the napkin should be kept for the doctor's inspection.

Puerperal Fever.—One of the most grave conditions which can occur during the puerperal state is known as puerperal fever: this results from a septic infection

which has taken place during labor or the lying-in period. Every case of puerperal fever arises from the introduction of infectious material into some wounded portion of the genital tract. The modes of infection are two in number: first, the septic matter may be carried in on the fingers or instruments, and in this way physicians and nurses may be the agents of contamination. The second mode of entrance is readily understood when we remember the almost constant presence of bacteria in the cervical and vaginal structures and in the pubic hair. The nurse should see to it that this dreaded complication never occurs from any carelessness or lack of precaution on her part.

If called upon to nurse a case of puerperal fever, besides carrying out faithfully the treatment outlined by the physician, the nurse should do everything in her power to improve the patient's general condition. The woman should be kept thoroughly clean—she should be given plenty of fresh air to breathe, and her linen should be frequently changed. In addition to these attentions the nurse should see that the patient has a liberal supply of nourishment.

A *septic phlebitis* resulting from a thrombosis of the femoral vein is a not infrequent complication. The patient may first complain of pain in the neighborhood of the groin, which is soon after followed by swelling of the foot and leg. Absolute quiet is to be insisted upon. The leg is to be wrapped in cotton-wool, bandaged and elevated. In such cases massage is very dangerous, because the immediate danger lies in the fact that a portion of the blood-clot becoming broken off may be carried into the circulation and lodge in

one of the vessels of the lung, causing pulmonary embolism and sudden death.

Eclampsia is characterized by convulsions that may occur in pregnancy, during labor, or later in the puerperal period. They may be clonic or tonic. In the majority of cases, although not in all, premonitory symptoms announce the impending outbreak. Of these the most important are headache, vertigo, an unusual desire to sleep, flashes of light before the eyes, nausea, œdema of the face and extremities, disturbances of the memory, gloomy forebodings, and finally, the most important, the presence of albumin and casts in the urine.

The attacks may resemble somewhat those of epilepsy, but the cry is lacking and the facial contortions are far more hideous. When they occur during labor, the first one is often preceded by a short period of calm, in which the patient ceases to complain; she closes her eyes and seems to be asleep; the pulse becomes small and the respirations shallow. Then the convulsive seizure comes on, commencing in the muscles about the eyes and extending to those of the face and limbs. The superficial veins are swollen, the eyes become blood-shot, and the skin everywhere shows a marked degree of cyanosis. Involuntary evacuations may occur. On awakening from the attack, the patient complains of headache, impaired memory, and pains in the muscles. The body is often covered with a cold, clammy sweat. Too often the patient dies in the first attack, or convulsion follows convulsion with lightning-like rapidity till death occurs from sheer exhaustion. During a convulsion a wedge should be placed between the teeth, to prevent

laceration of the tongue. As little restraint as possible should be used. Chloroform may be employed when the convulsions follow in quick succession. Infusions of saline solution should be given and the bowels moved freely. Free perspiration should be induced. As soon as the patient can swallow she should be made to drink water freely.

Eclampsia predisposes to post-partum hæmorrhage and to puerperal inflammations. In fatal cases death results from asphyxia, due to spasm of the respiratory muscles or to exhaustion of the nervous system, either from the direct effect of the uræmic poisoning or from the continuous muscular exertion. The earlier the convulsions occur, the more unfavorable the prognosis. It is very rare for the convulsions, if they appear during pregnancy, to cease previous to the birth of the child. Under such circumstances half the children are born dead. The routine examination of the urine of pregnant women is an indispensable precaution.

Albuminuria calls for special treatment. The utmost care should be taken to avoid all mental excitement, anything which would interfere with the digestion, and sudden variations in temperature. When there is œdema of the limbs and face a strict milk diet will be enjoined and suitable medicinal treatment will be ordered by the physician. The action of the skin is to be promoted by means of the wet pack, and the bowels should be kept freely opened by laxatives.

Puerperal Insanity. The insanity which sometimes occurs during the puerperal period generally takes the form of melancholia, although genuine mania is not uncommon. In the treatment the orders usually are to check excessive discharges, support the patient's

strength, and ensure perfect quiet and freedom from mental irritation. Upon the appearance of the first sign of this complication the child should be taken from the breast and the patient put upon a liquid diet. The bladder and rectum are to be emptied at proper intervals, and attention should be paid to the regulation of the heat and light of the room. The skin is kept active by sponging, and the sacrum watched carefully for the appearance of bed-sores. All pictures or articles of furniture in the room which seem to disturb the patient must be removed. Dr. William T. Lusk says that he knows of no other condition in which a trained nurse can be so valuable. She must see that the patient is kept covered, that she does not injure herself, and that no member of the family is allowed in the room. Above all, the nurse must gain the confidence of her patient and try to keep her quiet without using force.

Cold to the head is effective for the severe headache which will often be complained of. The patient must never be allowed to get out of sight, and, above all, the mother and child should never be left alone together for a moment, as a suicidal or infanticidal tendency is usually present. During convalescence, rest and sleep, nutritious food and daily evacuations of the bowels are factors which hasten a return to health.

CHAPTER XXVII.

Disorders of the Special Senses.—Nursing in Diseases of the Eye, Throat, Nose and Ear.

The special anatomy and physiology of the organs which have to do with the special senses and their relation to other parts of the body must be included in the general course of training, in order that the nurse may be able to carry out orders intelligently when dealing with the various disorders which affect these most important functions. Moreover, in her work in hygiene she will be taught how many of these diseases, which often entail very serious consequences, can be prevented. With congenital or acquired defects affecting the special senses we shall not deal here, but shall confine ourselves to pointing out briefly some of the nurse's duties in diseases of the eye, throat, nose and ear.

Diseases of the Eye.—Pain, redness, heat, sometimes swelling and more or less impairment of function are usually among the first symptoms in diseases of the eye. *A condition of fatigue of the muscles of accommodation* is very common and is generally associated with redness of the lids or conjunctivæ, pain in the eye and a more or less diffuse headache. If the condition is due merely to over-strain, it can readily be relieved by rest, hot or cold applications, and massage. If, however, it is of frequent occurrence and comes on very readily the patient should consult an oculist, as in

many cases some degree of astigmatism or some other defect exists, which can be remedied by the wearing of proper glasses.

The term *ophthalmia* includes all inflammations of the conjunctivæ and should not be applied to other diseases of the eye. *Purulent ophthalmia* in infants is commonly called *ophthalmia neonatorum* and has already been described in the chapter on diseases of children.

The treatment consists in keeping the eyes free from the poisonous material. To effect this frequent washings or irrigations with a saturated solution of boric acid are employed. For the pain a solution of cocain is sometimes ordered. For the discharge solutions of nitrate of silver are sometimes ordered; these must not be used by the nurse except under the direction of the physician.

If, as more often happens in the case of adults, only one eye is affected, the well eye should be protected by means of a Buller shield, which can be made as follows: Take two pieces of india-rubber plaster one 4 inches, the other 4½ inches square. Cut a round window in the middle of each. Stick them together after having inserted between them in the window a small watch-glass. The plaster is fastened by its free border and by other strips to the nose, forehead and cheek, the lower outer angle being left open for ventilation. Through the glass the patient can see and the eye can be kept under observation.. The strictest precautions against conveying the infection to the sound eye of the patient and to those of others must be taken. The nurse must touch her face with her hands as little as possible, and then only after her

hands have been thoroughly disinfected. All dressings should be burned or soaked in a 1 to 500 bichloride solution, and then boiled. As the disease is exhausting rest in bed and a nourishing diet are helpful.

Muco-purulent ophthalmia occurs as an acute disease especially in spring and autumn. This form of conjunctivitis is often popularly termed "pink-eye." It generally runs its course and terminates favorably in about two weeks. There is great congestion; the patient feels as if grains of sand were sticking under the lids, and there is a more or less free muco-purulent discharge. The cornea rarely suffers. The disease is contagious. Mild antiseptic lotions are employed, and cleanliness and hygienic surroundings hasten the recovery.

Various forms of conjunctivitis are often associated with the exanthematous fevers in children, especially measles, and need careful attention.

Granular ophthalmia, trachoma (or "granular lids") is relatively common among children, and also among adults, especially in the families of Russian immigrants. To the usual signs of conjunctivitis are added the presence of masses of granules—the "sago-grain" or "follicular" granulations. The disease is contagious and no child affected with it should be allowed to attend school. Dirty surroundings favor the spread and duration of trachoma. General hygienic treatment is all important. Astringent and cleansing solutions are employed and the lids are everted and painted with strong solutions of nitrate of silver. Copper sulphate (bluestone) is preferred by many oculists.

Iritis, or inflammation of the iris, is usually due to syphilis or rheumatism, but may result from wounds

and other injuries of the cornea. The color of the membrane changes, and its textures show a kind of "muddiness." Adhesions between the posterior surface and the capsule of the lens are apt to follow. There is severe pain, the movements of the iris are diminished and there is more or less photophobia. In these cases the physician usually orders the instillation into the eye of a few drops of a solution of atropin (atropin. sulph. grs. iv, Aq. ℥i). This paralyzes the muscle and puts it at rest, allowing the pupil to dilate. In addition to the atropin applications of hot water are generally grateful and sometimes leeches are applied over the temple.

In *glaucoma,* where, owing to pressure within the eyeball the pupil is dilated and fixed, or when a foreign body or an injury has produced an iritis, iridectomy—the cutting away of part of the iris—is often performed.

Cataract, or opacity of the crystalline lens, in most cases occurs in elderly people. When the process is complete—or in common parlance when the cataract is ripe—it has a milky white appearance and can be extracted as a solid body. After removal of a cataract, a bandage is applied and not removed for a week. The patient is kept quiet in a darkened room and only light diet is permitted. In younger individuals, or in other patients when the cataract does not ripen and become solid, dispersion is brought about gradually by "needling."

Strabismus or squint is due to a want of balance in power between the opposing muscles which should hold the eyeball in position. Some forms can be relieved by appropriate glasses and exercises. In other cases

tenotomy—the cutting of the muscle—is resorted to. A *sty* is a boil or abscess which forms at the root of an eyelash. Bathing with very hot water—every hour or so—will relieve the pain and hasten suppuration.

Eye affections sometimes occur as complications in various infectious fevers—particularly measles. In such cases prompt care may prevent serious later consequences. Hot applications of a boric acid solution (a teaspoonful to a glass of hot water) relieve pain and keep the eye clean. For injuries to the eyes hot and cold applications are employed. The former are used for infections of the cornea, the latter—in the form of iced compresses—for hæmorrhage and discoloration.

For the induction of *local anesthesia* for operations upon the eye cocain is used almost exclusively. The solutions (4 or 5 per cent.) should always be freshly made. In order to obtain total insensibility to pain, for 15 or 20 minutes before the operation a drop should be instilled into the eye every three minutes. During the intervals the eye is kept closed and a pad placed over it.

For assisting the surgeon during an operation on the eye or in the after-treatment the nurse must cultivate a light and skilful touch. The ordinary dressings are very simple—sterilized gauze pads, sponges, adhesive plaster and bandages. The applications used in disorders of the eye come in the form of lotions, ointments, various solutions to be dropped into the eye, chiefly for their astringent or soothing effects and boric acid solutions or normal salt solution for cleansing purposes. In order to paint the inside surface, the lid must be everted, a small camel's-hair

brush being employed for making the application. A room for ophthalmic patients should be kept well ventilated, and as a rule should be well lighted, the eyes being protected by bandages, dark glasses and green shields. For patients suffering from photophobia, however, the room should be darkened and the eyes should never be exposed suddenly to a bright light.

Affections of the *ear, throat* and *nose* can conveniently be considered together since the causative factors are often directly or indirectly the same. Thus adenoids and catarrh of the nose and throat often lead to disease of the middle ear and sometimes to deafness, since the morbid process extends upward through the Eustachian tube. For this reason the proper care of the throat is most important in health and disease. The importance of the removal of adenoids and enlarged tonsils is now generally appreciated. The after care consists in the use of sprays, light diet being given for a few days and the general comfort of the little patient being provided for. For special operations on the nose the surgeon will give directions suited to the particular case. The hygienic treatment of the *ear* in health is negative rather than positive. It is never well to do too much or to be meddlesome. It has been wisely said "Nothing smaller than the end of the little finger should ever be put into an ear," and nature provides normally for the removal of wax from the inner part of the ear by the action of the lower jaw during mastication. Children's ears should be protected from exposure to very severe cold winds, very cold water and draughts. After the bath the ear should be carefully dried with a relatively large pledget of cotton twisted on a stick.

In various disorders of the ear *syringing* is often ordered. This would seem to be quite a simple procedure, but needs to be done properly. A rubber ear syringe is often employed, but for thorough irrigation a douche bag serves the purpose much better. The patient is seated and protected so that his clothes will not get wet. The ear to be treated should be in a good light. A special kidney-shaped basin is held close to the neck just under the ear. The lobe is then drawn upward and backward to straighten the canal and a warm normal salt or boric acid solution is allowed to run in, the bag being elevated only sufficiently to allow of a gentle flow with but little force. The nozzle should always be pointed towards the upper part of the canal, so that the fluid will flow over the drum-head and not directly against it. Syringing of the ears is ordered when a purulent discharge is present or for the removal of foreign bodies or wax. After the syringing is finished the external portion of the canal is dried with pledgets of absorbent cotton.

Earache is a symptom which always warrants serious attention. It occurs very frequently in children and is often associated with very high fever and general constitutional disturbance. Until the physician arrives the application of dry heat externally in some form—hot flannels, a hot-water bag, a Japanese hot-box, or a hot salt bag—is often efficacious. Moist heat in the form of warm compresses or poultices is seldom ordered. The patient should be given a hot foot-bath and a cathartic. Some physicians order that a few drops of a solution of atropin (grs. iv to water ℥i) or laudanum and sweet oil should be warmed and dropped into the ear with an eye-dropper. A small

pledget of cotton is then inserted to absorb any excess of fluid, but is not to be left in long.

In cases of suppurative otitis media irrigations with a warm saturated solution of boric acid are usually ordered. Powders may be blown in through a quill but they are now rarely used, as they are liable to cake and then dam up the discharge.

The Skin.—In addition to its other functions the skin is the seat of the special sense of touch. In certain forms of nervous disease feeling is partially or entirely absent. Thus some patients can be pricked with a pin or burned without experiencing at the moment the slightest inconvenience; on the other hand in certain affections the skin is so sensitive that the slightest touch amounts to torture.

Diseases of the skin are either the result of constitutional disorders—of which they then constitute merely a symptom—or are the result of an unhygienic condition of the skin itself. For the nurse, the recognition of certain eruptions—such as the rashes of measles and scarlet fever—is very important, as the spreading of such diseases is much increased by any delay in the isolation of the patient. Among the more common skin diseases encountered in infancy and childhood are: eczema, erythema, scabies, ring-worm, boils, urticaria and pediculosis. In adults skin eruptions resulting from syphilis and nervous disorders are often met with. In children very many skin disorders can ultimately be traced to lack of hygienic surroundings and improper food, so that besides the local or constitutional remedies ordered by the physician, the treatment consists largely in cleanliness, proper food, fresh air and sunshine. For the intense itching that

is so frequently an annoying symptom in skin diseases, saline cathartics are sometimes ordered, the areas are protected from the irritation caused by clothing; soaps are prohibited and soothing lotions, ointments and baths containing alkalies, such as sodium bicarbonate or borax, or bland substances such as bran or starch, are employed. Before a series of mercurial inunctions is begun the patient should always be given a warm bath.

In cases of eczema scratching can be prevented by controlling the hands or arms so that they cannot reach the affected areas. For instance, in cases of eczema of the face or head, padded splints may be applied to the elbows.

Ringworm is very contagious; it usually appears on the scalp, but the skin of any part of the body may be invaded. Whatever the treatment ordered, it should be vigorously carried out even for some time after all signs of the disorder have disappeared. The part affected should be well washed with warm water before ointments are applied.

In *urticaria,* or *hives,* the vasomotor nerves are affected. The skin is covered with wheals and there is intense itching. The disorder is often due to indigestion caused by certain articles of food—in some people more especially by strawberries and shell-fish. Attention to the diet, saline laxatives, alkaline baths and avoidance of worry are indicated. The disease is sometimes very persistent and recurrences are frequent.

Herpes Zoster, popularly known as the "shingles" is due to inflammation of one or more nerve segments in the spinal cord. First a severe burning or

smarting is present; this is followed by an eruption of vesicles which have the same distribution as the cutaneous nerves. The most frequent seat of the eruption is around the waist (hence the name *zona,* a girdle) following the distribution of an intercostal nerve. The disorder is most frequent in spring and autumn, when the weather is variable. The neuralgic pains are sometimes so intense that the use of morphin becomes necessary. Locally anodyne ointments are employed and general tonic measures are indicated.

For *bruises* or subcutaneous hæmorrhages the local treatment consists of hot or cold applications, evaporating lotions or compresses of olive oil. The discoloration usually yields more quickly to the last remedy.

Finsen Light.—For dealing with superficial skin lesions Finsen of Copenhagen first introduced the actinic or light cure. He employed both sunlight and electric arc rays, the heat rays being eliminated. For therapeutic purposes the Finsen method has largely superseded the Roentgen rays. An intense white light is supplied by a high hanging lamp to which a telescope-like apparatus is connected. Through the latter the light is directed upon the affected part, a small area being treated at each sitting and a round piece of glass being adjusted snugly over the spot. Except for some slight inflammation and soreness the process is painless. Healing in cases of lupus is very gradual, a daily treatment of an hour being continued for from five to nine months. The chief disadvantages are the cost of the apparatus and the large number of exposures necessary; but already an improved and much cheaper apparatus has been invented by a Frenchman which promises to be a success.

CHAPTER XXVIII.

Nursing in Nervous Diseases and Insanity.—The Rest Cure.—Massage.—Electricity.

The nervous system forms an integral and most important part of the human body. Hence it naturally follows that, since the nerves receive their nutrition as do other parts, any disturbance in another bodily organ is reflected to a greater or lesser extent upon them and we have manifestations which show us that the patient is "nervous." Sometimes, it is true, the central nervous system seems to bear the brunt of the disorder, so that a patient whose ordinary bodily functions seem to be working satisfactorily and who is perfectly sound in other respects may lose all power of self-control, may act and talk irrationally and in fact may be temporarily or permanently insane. Thus we have an endless variety of gradations between two extremes—one characterized by a slightly increased irritability in a patient who is suffering from some slight ailment, the other represented by a condition in which the brain has become so disordered that the patient can no longer be held responsible for his thoughts, speech or actions. The latter class of patients is usually found in sanatoria or asylums; and it would certainly be well if every nurse could spend a few weeks in a good institution of this kind in order to round off her studies for general work; for putting aside the fact that in a general hospital many patients dur-

ing delirium are irresponsible and violent and that nervous and even insane patients are not infrequently admitted, at least temporarily, there is no doubt that the best nursing is impossible unless the mental no less than the physical condition of each patient is taken into careful consideration. And I believe that by a study of this kind a nurse could be impressed better than in any other way with the fact, that the irritability, excitability, unreasonableness and most of the trials of our patience that are associated with the taking care of sick persons are to be regarded merely as symptoms of disease, to be treated accordingly and to be met with kind, but no less judicious measures than those accorded to a patient suffering from severe bodily pain. It is a matter of regret that, largely on account of ignorance in this respect on the part of the nurse, nervous patients in general hospitals sometimes meet with real unkindness. Thus various symptoms belonging to neurasthenia or hysterical conditions are treated by the nurse as being merely foolish and unworthy of any serious attention, whereas the one thing needed by the patients is an appreciation of their sufferings and a wise sympathy. A nervous patient who thinks that the nurse does not understand or makes light of her sufferings can receive only a minimum of benefit from her care. For neurasthenic and hysterical patients are genuine sufferers, although their pains are not necessarily to be relieved by medicines alone. In the nursing of such patients the ethical qualities of the nurse are all-important, and it remains for her to supplement the measures ordered by the physician by a certain well-systematized and patient moral treatment.

Among the most common so-called functional ner-

vous diseases that every nurse must meet with in the hospital or in private practice are ***neurasthenia*** and *hysteria,* both of which conditions are often associated with insomnia. Among the disposing causes are an inherited unstable nervous temperament, shock, anxiety, over-work, continuous over-excitement, lack of proper nourishment and unhygienic surroundings. Again, these conditions are sometimes associated with definite organic disease. Nervous exhaustion in men may be the result of excessive brain wear, continuous care and responsibility, mental strain from anxiety and business difficulties aggravated by irregular habits or inattentions to the rules, the observance of which would tend to keep the body healthy. In women nervous prostration frequently results from lack of congenial work, too great indulgence in gaiety or the burden of so-called social duties which becomes too great when superadded to the strain of family cares. Nor is it surprising that when one woman endeavors to perform multifarious duties—any one of which would afford sufficient occupation—a breakdown of the nervous system, if not some form of insanity, should result.

Hysteria is a nervous disorder characterized by more or less frequent emotional outbursts often associated with motor disturbances. The patient is sometimes gay, more often depressed and is capricious in her tastes and very uncertain. Abnormal sensations are often complained of. Some patients feel as if there was a ball in the throat—the globus hystericus—which moves about but will not stay up or down. Others complain of a loss of feeling in a limb or in a whole side of the body. Some patients cannot stand or walk

at times—astasia abasia—whereas in an hour or two this power may entirely return. Temporary loss of speech and abnormalities of sight are often met with. In an hysterical attack the patient may laugh or cry, scream or be dumb; she may fall and lie apparently unconscious or may struggle violently. A more aggravated form of attack occurs in what is known as *hystero-epilepsy.* A hysterical attack often resembles an epileptic seizure, but may be distinguished from it by the fact that the patient is only partly unconscious, the reflexes are active, and the cry and grinding of the teeth peculiar to epileptics are absent. Moreover, the patient seems to be careful not to hurt herself, although she may fall and throw herself into the most grotesque contortions. In all forms the urine is increased in quantity; it is generally pale and of a low specific gravity. Such patients should be watched carefully, but without allowing them to become conscious of the fact, in order to learn what symptoms are real and what are feigned. So far as the nurse is concerned, the methods of treatment in neurasthenia and hysteria are very much alike. She needs to be sympathetic, but very firm without being in the least unkind. In the milder forms a little well managed apparent neglect is sometimes wholesome, as such patients love to be fussed with. Rest in bed, careful nourishment and later massage are usually indicated. The influence of a capable nurse in strengthening the general morale of the patient is, however, always important.

Epilepsy.—A brief description of an epileptic attack is to be found elsewhere (p.304). Between the attacks epileptics are often bright, good-tempered and

able to carry on their every-day work. Some, however, especially after the disease has lasted a long time and the attacks have been frequent, show a greater or less degree of mental enfeeblement and are often very troublesome patients.

Insomnia is often a very troublesome symptom with which the nurse has to contend, and is met with under many conditions. It is often the result of some nervous disease, but when it persists it also aggravates the condition which has caused it. In order to cure insomnia, when possible, the cause must be removed. Besides the removal of all sources of worry, indiscretions in diet must first be corrected, tea, coffee, and any articles of food which might produce indigestion or over-stimulation being restricted or forbidden altogether.

Gentle massage, a tepid bath or sponging the body with tepid water at bed-time or cold or warm packs are often helpful. The bed must be made comfortable. There should be sufficient but not too much covering; the feet should be kept warm and the head cool. Often a glass of warm milk, beef tea or cocoa, at bed-time, and the reading in a somewhat monotonous tone of some unexciting literature will send the patient into a comfortable sleep. Hypnotics or stimulants should never be given without express orders from the physician.

Certain forms of *insanity* are necessarily met with in the wards of a general hospital. In the first place patients may develop a form of insanity during the course of an acute disease or during convalescence. Again, insane patients are sometimes admitted temporarily for surgical reasons. Post-febrile insanity is

not infrequently met with after severe cases of fever—especially typhoid fever or influenza—after child-birth and after surgical operations. In a general hospital a nurse should always remember the strain that is put upon new patients who have left their homes and have come to submit, perhaps, to some serious operation. Nurses who have submitted to operations themselves have told me how much they had learned thereby. We who are accustomed to hospitals are too apt to forget that almost every patient must undergo mental suffering to some extent and to those who have a highly nervous organization this amounts to an agony. A little thought, kindness and consideration on the part of the nurse will often effect far more than she expects.

Some of the advantages of a course of study in an asylum were mentioned at the beginning of this chapter. In addition the nurse will learn many fine details of nursing, which are not of such vital importance, but with certain modifications can often be utilized in the case of a sane patient. Thus she will get a good understanding of the line of moral treatment to be pursued, the uses and indications for seclusion, restraint and freedom; of the peculiarities of different dispositions, the importance of congeniality and compatibility; the uses of employment, amusement and exercise; the special precautions employed for the safety of the patient and nurse, and the special forms of treatment employed. Furthermore, she will have an added opportunity for putting into practice various procedures which she has already learned—the giving of baths and electricity, and the various hydrotherapeutic procedures. In an insane hospital she can also

add much to her knowledge about food and suitable dietaries; she will be taught how insensible or fractious patients can be nourished—by forced feeding—and how unpromising patients by dint of kindness and tact can be made to assist the physician and nurse in improving their condition.

Good nursing in mental and nervous cases is far more exhausting and requires much more intelligence and broader capabilities than those necessary for one who limits herself to taking care of fever or surgical patients. In cases of nervous disease the nurse is required to give of her best, the mental qualities standing for much more than physical labor. If a woman after having had a good general training is successful in taking care of nervous patients we need never fear to entrust her with any case of sickness.

The Rest Cure.—We will only say a few words on a method of treatment so frequently prescribed in cases of hysteria and neurasthenia, which has obtained the name of "the rest cure," and has been so strongly recommended and so much written about by Weir Mitchell, Playfair, and others. The patients to whose cases it is particularly applicable are those suffering from nervous exhaustion, such as is seen in nervous, hysterical women. Where the prostration is severe, in order to procure much relief the patient must in most cases be removed from her home and placed in an institution where she may have the advantages of this "rest-cure treatment." To become expert in dealing with these patients it would be advisable for a nurse, if she intends to devote herself especially to the care of such cases, to spend some months in a hospital

where the treatment of such diseases is made a specialty.

The first step in the cure is to ensure the complete isolation of the patient. No one should see her but the nurse, the physician, and the *masseuse.* Absolute rest in bed, massage, electricity, and systematic *overfeeding* are desirable. Very little if any reading, and no sewing or writing of letters, should be allowed. Usually the patient is kept in bed for from four to ten weeks. The massage is an important feature, and should be given at first very gently for a few minutes at a time, and gradually increased. The food should be abundant, easily digestible, and given at regular intervals. For extreme nervousness or sleeplessness the hot foot-bath, the warm full bath and hot or cold packs are used.

The nurse, while very firm, should be especially bright, cheerful, and good-tempered, but she must observe a happy mean and be careful not to be oversympathetic with her patient. When the nervous system has become rested and strengthened, it is advisable to allow the patient to return gradually to her former occupations and habits of life.

Massage, a word coming through the French from the Greek verb meaning "to knead," also includes rubbing and light pounding combined with stimulation of the skin by friction and slapping. These various procedures now constitute a very valuable resource of modern therapeutics. To become an expert not only natural gifts—above all the possession of a suitable hand, a good physique and a special temperament—but a scientific training and long practice are also necessary. Naturally, then, we cannot expect that ev-

ery graduate should leave a general training-school for nursing as an expert masseuse. Nevertheless it is not only desirable but absolutely necessary that the nurse should have a good general knowledge of the principles of massage, its physical and physiological effects and its general application, because such knowledge will enable her to do much for the relief and comfort of almost any kind of patient. Take, for instance, the simple rubbing of the back. How much better it can be done if the nurse understands the proper movements necessary in grasping and manipulating the muscles to increase circulation or to produce a sedative effect. As a rule the patient will quickly distinguish between an intelligent massage and mere haphazard rubbing and will be grateful to the nurse in proportion to the amount of comfort received from the procedure. General massage for its tonic effect can very well be given by the nurse to convalescents from pneumonia, typhoid fever and other acute conditions. In the hands of an expert masseur or masseuse this treatment is now ordered for various conditions—medical and surgical—especially in conjunction with the rest cure and for the benefit of joints thickened and stiffened as the result of inflammatory deposits.

The teaching of the subject is only possible after the student has acquired a good knowledge of human anatomy and physiology. She must know the location, function and action of the various bones, joints, muscles and internal organs, as well as their sources of nutrition.

Scientific massage is meant to take the place of active voluntary exercise, under circumstances that

have rendered the latter impossible. It gives tone to the muscles, aids the circulation of the blood and increases the action of the skin, thus promoting the absorption of nourishment and the removal of waste material from the system. It can be made to exercise either a stimulating or a sedative effect upon the nerves, the latter being especially desirable in cases of insomnia. It is also prescribed for the reduction of swelling from sprains and other causes, for the gradual separation of adhesions and to promote peristalsis of the bowels in cases of chronic constipation.

It can be readily understood what an important part the hand plays in massage. The touch must be gentle but firm. The hand must be normally warm, dry, and impart a certain sensation of delicacy and elasticity. The woman who has a cold clammy hand can never give a satisfactory massage.

For the procedure itself a few fundamental rules always hold good: A loose corset waist must be worn instead of a corset, the dress should be white and fresh and the hands free from rings and the scent of toilet soap. The bed or couch should be placed out of the way of drafts and the mattress should be firm but not too hard. The patient is wrapped in a gown and placed between two blankets. Only the part being treated should be exposed and care should be taken not to allow the patient to be chilled. For giving a general massage the nurse stands on the right side of the bed and begins with the lower extremities. The duration of the treatment never exceeds an hour and at first twenty minutes to half an hour is quite long enough. The manipulations are made slowly and evenly, the whole hand being employed, particularly the palm

and the thick part of the thumb. For deep massage all the work should be from the extremities towards the trunk, from the insertion to the origin of the muscles and in the direction of the returning currents of the circulation. After the treatment the patient should rest for at least an hour. The time at which the massage should be given varies according to circumstances and the object for which it is prescribed. Where a soothing effect is desired the treatment should be gentle and given at night, the patient being allowed to go to sleep immediately afterwards. For a stimulating effect a brisk massage may be given in the morning, two hours before or after a meal.

During a treatment the nurse should not talk more than is necessary. The lower extremities are taken first, then the thighs, the upper extremities, chest, abdomen and finally the back. First comes friction of the skin, then the gradual kneading and stroking of the muscles and lastly percussion and vibration. When ordered, passive motions are added, the work on one part being finished before another part is taken in hand. Only from practical demonstrations of the actual manipulations as applied to an actual patient can the student gain even an approximate idea of the proper methods.

Electricity.—Three forms of electricity are employed in medicine—the galvanic and faradic currents and static electricity. The first two are often used for diagnostic purposes, inasmuch as a good deal of information can be gained from finding out whether given nerves or muscles react to either one or both of the currents. Moreover, the nature of the reaction, when present, is important. Under the direction of an expert the nurse

can readily learn sufficient about the various forms of apparatus employed to give the simpler kinds of electro-therapeutic treatment; the more difficult manipulations will always be undertaken by the specialist himself.

VOCABULARY.

MEDICAL.

Acme, ak′me. Crisis or height of a disease.

Acute, ā-kūt′. An *acute* disease, one in which the onset, progress, and termination are rapid. Applied to pain, *acute* means severe, sharp.

Affu′sion. A pouring upon; *e. g.* affusions of water are used to reduce temperature.

Algid, al′jid. Cold, chilly.

Aliment′ary. Pertaining to nutrition.

Anæmia, an-ē′me-ah. Deficiency in the number of red corpuscles or of the coloring matter of the blood.

Analgesia, an-al-jē′sē-ah. Insensibility to pain.

Anasar′ca. General dropsy.

An′gina Pec′toris. Pain and oppression about the heart.

Anodyne, an′ō-dīn. An agent which relieves pain.

Anorexia, an-or-eks′ē-ah. Loss or diminution of appetite.

Antipyret′ic. (*subs.*) An agent which reduces fever; (*adj.*) fever reducing

Aphasia, ah-fā′ze-ah. Partial or complete loss of the power of speech.

Aphonia, ah-fōn′e-ah. Loss of voice.

Ap′oplexy. A sudden paralysis (generally from rupture of a cerebral vessel).

Apyrexia, ah-pi-reks′e-ah. A state of freedom from fever.

Ascites, a-si′tēz. An abnormal collection of fluid in the abdominal cavity.

Asphyx'ia. Suspension of animation from lack of oxygen in the blood.

Aspira'tion. A method of withdrawing fluids by means of the aspirator.

Asthenia, ah-sthē'ne-ah. Loss of strength. Weakness.

Ataxia, atax'ē-ah. Incoördination of muscular action.

Atrophy, at'ro-fe. Wasting of a part from lack of nutrition.

Aura, ō'rah. A peculiar sensation, such as usually precedes an epileptic fit.

Auscultation, os-cul-tā'shun. The act of listening to sounds produced in organs of the body, usually the heart and lungs.

Benign'. Mild, not malignant.

Borborygmus, bor-bō-ryg'mus. Rumbling in the intestines.

Cachexia, kak-ex'e-ah. A depraved condition of nutrition.

Cada'ver. The dead body.

Centigrade Thermometer. A thermometer the scale of which is divided into 100 parts or degrees, 0° representing the freezing-point and 100° the boiling-point of water.

Chore'a. A disease characterized by involuntary muscular twitchings; St. Vitus' dance.

Chronic, kron'ik. Long continued, often opposed to *acute*.

Clinic, klin'ik. Bedside instruction.

Collapse'. Complete prostration of the vital powers.

Co'ma. A state of profound stupor.

Co'ma-vigil. A condition of unconsciousness and delirium in which the patient lies with open eyes.

Conta'gion. The communication of a specific disease by contact.

Coördina'tion. Harmonious action; *e. g.* of muscles.

Contraindication. Indication against.

Corpuscle, kor-pus-l. A minute body; a cell.

Crisis, krī'sis. The turning-point in a disease.

Cyano'sis. Bluish color of the skin, due to imperfect oxidation of the blood.

Decubitus, dē-kū'bi-tus. The recumbent position. A form of bed-sore.

Defervescence, dē-fer-ves'ens. Decrease of fever.

Deglutition, deg-lū-tish′un. The act of swallowing.

Dejection, dē-jek′shun. A discharge of fæcal matter.

Delirium, dē-lir′e-um. A wandering of the mind.

Dementia, dē-men′she-ah. Form of insanity with loss of the reasoning powers.

Deple′tion. The withdrawal of fluid from some part of the body.

Desquamation, des-kwā-mā′shun. Peeling off; *e. g.* of the outer skin.

Diagno′sis. The recognition of disease from its signs and symptoms.

Diathesis, dī-ath′e-sis. A predisposition to disease.

Dicrotic, dī-krot′ik. A term applied to a pulse which gives the sensation of a double beat for each contraction of the heart.

Dyspnœa, disp-nē′ah. Difficult or labored breathing.

Em′bolism. The obstruction of a blood-vessel by an embolus or plug.

Empyema, em-pī′ē-mah. A collection of pus in the pleural cavity.

Epistaxis, ep-i-stak′sis. Hæmorrhage from the nose.

Eructation, ē-ruk-tā′shun. The bringing up of gas from the stomach.

Exacerbation, eg-zas-er-bā′shun. Increased severity of symptoms.

Excreta, eks-krē′tāh. Natural discharges of the body.

Expectant, eks-pek′tant. Awaiting; *e. g.* the expectant mode of treatment by non-interference.

Expiration, eks-pī-rā′shun. The act of breathing out.

Fæces, fē′sēs. The discharges from the bowels.

Febrile, fē′brīl. Pertaining to fever.

Fissure, fish′ūr. A crack.

Flat′ulence. The presence of gas in the alimentary canal.

Fluctuation, fluk-tū-ā′shun. The undulation of contained fluid upon pressure.

Formica′tion. Sensation as of ants creeping over the body.

Gastritis, gas-trī′tis. Inflammation of the stomach.

Gavage (Fr.) Forced feeding.

Glo′bus Hyster′icus. Sensation (in hysteria) as of a ball in the throat.

Hæmatemesis, he-mat-em′e-sis. The vomiting of blood.

Hæmoglo′bin. The coloring matter of the red corpuscles.

Hæmoptysis, hem-op′ti-sis. The spitting of blood.

Hæmorrhage, hem′or-āj. Flow of blood from the vessels.

Hæmostatic, hem-o-stat′ik. Arresting hæmorrhage; (*subs.*) an agent to stop hæmorrhage.

Hectic, hek′tik. Pertaining to wasting or phthisis.

Hemiplegia, hem-i-plĕg-ē-ah. Paralysis of one side of the body.

Hepatiza′tion. Change into a liver-like substance.

Heredity, her-ed′i-te. The transmission of traits of ancestors to their offspring.

Hiccough, hic′kup. The spasmodic contraction of the diaphragm with sudden closure of the glottis.

Hydrop′athy. Treatment of disease by the use of water.

Hydrothorax. A condition in which there is a watery fluid in the pleural cavity.

Hygiene, hī′jē-en. The science of health.

Hyperæmia, hī-per-ē′me-ah. Excess of blood in the vessels of a part.

Hyperpyrexia, hī-per-pī-reks′e-ah. An excessively high temperature of the body.

Hyper′trophy. An abnormal increase in the size of a part or organ.

Hypnotic, hip-not′ik. Sleep-producing; (*subs.*) an agent which produces sleep.

Hypoder′mic. Under the skin—applied to the injection of medicines under the skin.

Hyperæsthesia, hī-per-es-thē′ze-ah. Excessive sensibility.

Icterus, ik′ter-us. Jaundice.

Idiosyncrasy, id-i-ō-sin′krā-se. Individual peculiarity.

Inani′tion. Exhaustion from starvation.

Incoördination, in-cŏ-or-din-ā′shun. The state of inability to produce coördinated muscular movements.

Incubation, in-kū-bā-shun. The period which elapses between the introduction of the contagium and the development of the symptoms.

Inges′ta. Substances introduced into the body by the mouth.

Infect′ion. The communication of the germs of disease.

Inocula′tion. The introduction of a specific virus into the system.

Insolation, in-sŏ-lā′shun. Sunstroke.

Inunc′tion. The act of rubbing in an ointment.

Lactom′eter. An instrument for measuring the specific gravity of milk.

Lac′toscope. An instrument for testing the quality of milk.

Laryngismus Strid′ulus. Spasmodic contraction of the glottis; false croup.

La′tent. Concealed, not manifest.

Lavage (Fr.) Irrigation of the stomach.

Le′sion. A morbid change in the function or structure of a tissue from injury or disease.

Leth′argy. A condition of drowsiness.

Lysis, lī′sis. Gradual decline, more especially of a febrile disease.

Macera′tion. Steeping in fluid to produce softening.

Marasmus, mar-az′mus. A wasting or emaciation.

Metastasis, met-as′tă-sis. Change in the seat of the disease.

Me′grim. Neuralgia or headache of one side of the head.

Narcot′ic. Producing narcosis; (*subs.*) an agent which produces a condition of lethargy or sleep.

Nephritis, nef-rī′tis. Inflammation of the kidneys.

Neurasthenia, nū-ras-thē′ne-ah. Exhaustion of nerve-force.

Neurosis, nū-rō′sis. A nervous affection of a functional nature.

Non Com′pos Men′tis. Of unsound mind.

Nostalgia, nos-tal′je-ah. Homesickness.

Œdema, ē-dē′mah. Accumulation of serum in the cellular tissue.

Ophthalmia, off-thal′me-ah. Inflammation of the conjunctivæ.

Orthopæ′dic. Pertaining to the correction of deformity.

Orthopnœ′a. Difficulty in breathing, relieved only by the upright position.

Osmo′sis. The diffusion of fluids through membranes.

Pædiatrics, ped-e-at′riks. The treatment of the diseases of children

Palliative, pal′i-a-tiv. Mitigating, relieving.

Paracentesis, par-a-sen-tē′sis. The operation of puncturing a cavity of the body (in order to draw off fluid).

Paraple′gia. Paralysis of the lower half of the body.

Paresis, par′es-is. Slight paralysis. Partial loss of muscular power.

Paroti′tis. An inflammation of the parotid gland. The mumps.

Pathogen′ic. Causing disease.

Percus′sion. Light tapping or striking on any part of the body for diagnostic purposes.

Peristal′sis. Undulating movements of the intestines.

Pertus′sis. Whooping cough.

Photopho′bia. Abnormal sensitiveness to light.

Pro′dromes. Precursory symptoms.

Prophylaxis, prŏ-fil-aks′is. Prevention of disease.

Ptomaïnes, tŏ′mā-ins. Alkaloids formed during the decomposition of organic matter.

Quotidian, kwot-id′i-an. Occurring every day; *e. g.* quotidian fever in which the paroxysm occurs every day.

Rad′ical. A form of treatment meant to destroy a disease.

Reac′tion. Recuperation or return of power after depression.

Recur′rent. Returning at intervals.

Re′flex. A term applied to an involuntary action produced by an indirect nerve-stimulus.

Regurgita′tion. The flowing back or the rejection of the contents of a hollow organ.

Relapse′. Recurrence of the disease before complete convalescence.

Remit'tent. Alternately abating and returning.

Resolu'tion. The gradual return of the tissues to their normal condition after inflammatory conditions.

Retching. Attempts at vomiting.

Rhythm, rithm. A measured movement.

Rigor, rī'gor. A chill. Rigidity.

Rigor mortis. The muscular rigidity which occurs shortly after death.

Satura'tion. A term used to denote that a fluid contains as much of a solid substance as it can dissolve.

Sequela, sē-kwel'ah. Abnormal condition following the decline of a disease.

Singul'tus. Hiccough.

Sopor, sō'por. A drowsy condition.

Sordes, sor'-dez The brownish deposit that tends to accumulate about the teeth in disease.

Sporad'ic. Scattered, or occurring in isolated cases or groups.

Steno'sis. Constriction or narrowing.

Stercoraceous, ster-kō-rā'she-us. A term applied to vomited matter containing fæces.

Ster'torous. Breathing with a snoring sound.

Stomatitis, stō-mat-ī'tis. Inflammation of the mouth.

Strabis'mus. Squint. Condition of the eyes in which the visual axes do not meet at the desired objective point.

Stridulous, strid'ū-lus. Making a harsh or strident sound.

Subacute'. Midway between acute and chronic.

Subsul'tus Ten'dinum. Muscular tremor or twitching.

Sudorif'ic. Sweat-producing; (*subs.*) an agent which induces sweating.

Syn'thesis. Formation of a compound by the uniting of its [elements.]

Syn'cope. Fainting or swooning.

Tabes, tā'bēz. Progressive emaciation.

Tabes dorsalis. A disease of the nervous system, sometimes called *locomotor ataxia*.

Tenes'mus. The painful desire, coupled with straining, to empty the bowels or bladder.

Therapeu'tics. The medical science relating to the application of remedies,

Thermom'eter. Instrument for measuring intensity of heat.

Thrombo'sis. The formation of a blood-clot in a vessel.

Tor'mina. Griping pain in the bowels.

Tox'ic. Poisonous.

Traumatic, traw'mat'ic. Pertaining to a wound.

Tus'sis. A cough.

Tympanites, tim-pan-ī'tēz. The distension of the abdomen with gas.

Urtica'ria. Nettle-rash.

Vaccina'tion. Inoculation with a virus obtained from cows to protect against small-pox.

Variola, vă-rī'ō-lah. Small-pox.

Vas'cular. Pertaining to vessels.

Ver'tigo. Dizziness.

Ves'icle. A small blister.

Vicarious, vī-kă're-us. The term applied to the assumption of the function of one organ by another.

Vol'atile. Readily evaporating.

Vis'cous or **Viscid.** Glutinous. Ropy.

SURGICAL.

Abra'sion. Excoriation of the skin or mucous membrane.

Acupressure, ak'ū-press-ūr. The compression of blood-vessels by means of needles.

Ac'upunc'ture. Puncture of tissues with needles f r the relief of pain.

Adeno'ma. A glandular tumor.

Adhe'sion. The growing together of two surfaces or parts.

Amputa'tion. A removal of a part of the body.

Anæsthe'sia. A condition in which sensation is lost.

Anastomo'sis. The junction of vessels.

Angio'ma. A tumor formed of blood-vessels.

Ankylo'sis. Stiffness of joint due to adhesions between its surfaces.

Antisep'tic. Preventing the growth of organisms which produce putrefaction.

Apposi'tion. In contact.

Arthritis, ar-thrī'tis. Inflammation of a joint.

Asepsis, a-sep'sis. The absence of septic matter.

As'pirator. Instrument for withdrawing fluids from cavities.

Atheromatous Degeneration, ath-e-rō'ma-tus. Fatty degeneration of arterial walls, with deposition of lime salts, rendering the vessels brittle.

Bifurcate, bī-fėr'kāt. To divide into two branches.

Bistoury, bis'too-rē. A narrow-bladed knife used in surgery.

Bougie, boo-zhē'. Cylindrical instrument for dilating canals.

Cal'lous. Hard.

Cal'lus. New bony deposit about a fracture.

Cann'ula. A small tube.

Carcinoma, kar-sē-no'ma. Cancer. A malignant form of tumor.

Ca'ries. A local death of bone.

Caus'tic. Burning; (*subs.*) a substance which destroys living tissue.

Cellulitis, sel-ū-lī'tis. Inflammation of the cellular tissue.

Cicatrix, si-kā'triks. The scar which remains after the healing of a wound.

Cicatrization, sik-a-tri-zā'shun. The process of healing.

Circumduc'tion. Circular movement of a limb.

Clon'ic. Applied to spasms with alternate contractions and relaxations.

Coagula'tion. A clotting.

Coaptā'tion. The adjustment of edges of wounds or fractured bones.

Comminu'tion. Breaking into pieces.

Colot'omy. Incision into the colon.

Contu'sion. A bruise.

Coun'ter-exten'sion. Opposing traction upon a limb in extension.

Crep'itus. The grating of the ends of fractured bones.

Cystotomy, sis-tot'ō-me. A cutting into the bladder.

Demarca'tion (Line of). The line dividing dead from living tissue.

Disarticula'tion. Amputation of a limb at a joint.

Dors'al. Pertaining to the back.

Emphyse'ma. Distension of tissues with air or other gases.

Empyema, em-pī-ē'mah. A condition in which there is pus in the pleural cavity.

Enucleation, ē-nū-kleē-ā'shun. The peeling out of a tumor from its sack. (Of the eye.) The excision of the eyeball.

Epithelioma, ep-i-thē-le-ō'mah. A cancerous growth of the skin or mucous membrane.

Es'char. The dry crust of dead tissue.

Es'march's Bandage. Elastic rubber bandage used to prevent or control hæmorrhage.

Ever'sion. The folding outward.

Excis'ion. Act of cutting out or away.

Excoria'tion. Abrasion of the skin.

Excrescence, eks-kres'ens. An abnormal outgrowth.

Exten'sion. Traction upon a fractured or dislocated limb. The opposite of flexion.

Extirpa'tion. The removal of a part.

Extravasa'tion. Effusion of fluid into the tissues.

Exuda'tion. The oozing out of fluids.

Fenes'trum. An opening.

Fistula, fis'tū-lah. An abnormal opening between two parts of the body.

Fixation. A making firm or rigid.

Flexion, flek-shun. The process of bending.

Fluctua'tion. Wave-like motion.

Graft. Transplanted living tissue.

Granula'tions. A reticulated framework of tissue containing embryonic cells.

Hæmatoma, hem-at-ō'mah. A tumor containing blood.

Her'nia. Protrusion of any viscus from its normal cavity through normal or artificial openings in the surrounding structures.

Immobilization. The act of fixing a part in such a manner as to render it immovable.

Impac′tion. The condition of being wedged together.

Incis′ion. A cutting into. A cut.

Indura′tion. Hardening of a part.

Inflamma′tion. The response of living tissue to injury.

Intuba′tion. The insertion of a tube into the larynx.

Inver′sion. The turning of an organ inside out or upside down.

Liv′id. Having a dusky bluish color (due to congestion).

Necrosis, ne-krō′sis. Death of tissue.

Ne′oplasm. A new growth.

Occlusion, ok-lū′shun. A sealing or blocking up.

Ossifica′tion. Formation of bone.

Ostalgia, os-tal′je-ah. Pain in bone.

Osteomyeli′tis. Inflammation of the bone, (*lit.*) of the marrow of the bone.

Osteotomy, osteot′omy. A cutting operation on bone.

Perforation. An opening or penetration.

Phlebitis, flē-bī′tis. Inflammation of a vein.

Plas′tic Operations. The engrafting of tissue from one part to another.

Prona′tion. Position of the arm when the palm of the hand is turned downwards.

Pyæmia, pī-ē′me-ah. Septicæmia with abscess-formations.

Resec′tion. Excision of a portion of bone.

Resolu′tion. The gradual disappearance of inflammatory products without the formation of pus.

Retrac′tion. Shortening. Drawing backward.

Sapræ′mia. Septic intoxication. Blood-poisoning.

Sarco′ma. A malignant tumor having the structural characteristics of connective tissue.

Scarification, skar-if-ik-ā′shun. The operation of making numerous small superficial incisions in a part.

Sep′tic. Relating to putrefaction.

Sequestrum, se-kwes′trum. A fragment of necrosed bone.

Slough, sluf. A portion of dead tissue which comes away after an ulcerative process.

Strangula'tion. Constriction. Choking.

Stricture, strik'tūr. A contraction of a duct or tube.

Styptic, stip'tik. Astringent; (*subs.*) an agent which stops hæmorrhage.

Subcuta'neous. Under the skin.

Suffu'sion. Slight diffused congestion.

Supination, sū-pin-ā'shun. Position of the arm when the palm of the hand is turned upwards.

Su'ture. Junction of cranial bones. In *surgery*, a stitch.

Synovitis, sin-ō-vī'tis. Inflammation of a synovial membrane.

Tax'is. The manual reduction of a hernia.

Ten'sion. Tightness. A condition of being drawn tight.

Tor'sion. A twisting.

Tourniquet, toor'nik-et. An instrument to compress arteries.

Toxæmia, toks-ē'meah. Poisoned state of the blood.

Traction. A drawing or pulling.

Transfusion. The injection of blood from the vessels of one person into those of another.

Transuda'tion. An oozing through.

Traumatic, traw-mat'ik. Pertaining to a wound.

Trismus. Lockjaw.

Trocar. An instrument consisting of a stilette contained in a metal tube, used for evacuating fluids from cavities.

Tumefaction. Swelling of a part.

Turgescence, ter-ges'ens. Swelling or enlargement of an organ.

Turgid, ter-jid. Swollen.

Ul'cer. An open sore.

Varicose, var'ik-ōs. A term applied to dilated and tortuous veins.

Venesec'tion. The operation of opening a vein.

Ves'icle. A small blister or sac.

GYNÆCOLOGY.

Adnexa. Appendages—*i. e.* the fallopian tubes and ovaries

Amenorrhœ'a. Irregularity or suppression of menstruation.

Anteflexion, an-te-flek'shun. A bending forward.

Antever'sion. A turning or leaning forward.

Catamenia, kat-a-mē'nē-ah. The menses.

Climac'teric. A critical period in life. Generally used to signify the time of life at which the catamenia cease.

Cyst, sist. A sac containing fluid.

Cystocele, sist'ō-sēl. Vesical hernia.

Defeca'tion. Evacuation of the bowels.

Douche, doosh. A stream of water directed forcibly against a part.

Dysmenorrhœa, dis-men-ō-rē'ah. Painful menstruation.

Endometri'tis. Inflammation of the lining membrane of the uterus.

Gen'u-pectoral. Pertaining to the knee and chest.

Hæmatosal'pinx. Distension of the Fallopian tube with blood.

Leucorrhœa, lū-kor-ē'ah. Whitish discharge from the vagina.

Menorrhagia, men-or-ā'je-ah. Excessive menstrual flow.

Menses, men'sēz. The monthly flow from the uterus.

Men'opause. The end of the menstrual life.

Metri'tis. Inflammation of the uterus.

Patulous, pat'u-lus. Expanded. Open.

Ped'icle. The stem or narrow portion of a tumor by which it is attached to a part.

Pes'sary. Instrument placed in the vagina to support the uterus.

Prolap'sus Uteri. Protrusion of the uterus as far as or beyond the vulva.

Retroflex'ion. A bending backwards.

Retrover'sion. A turning or leaning backwards.

Sal'pinx. The Fallopian tube.

Subinvolution. Insufficient involution

Superinvolu'tion. Excessive involution.

Tu'bal. Pertaining to the tube or oviduct.
U'terus. The womb.
Vagina, vā-jī'nah. The canal from the vulva to the uterus.
Vagini'tis. Inflammation of the vagina.
Vul'va. The external female genitals.

OBSTETRICS.

Abor'tion. The expulsion of the embryo at any time during the first three months of pregnancy.
Accoucheur, ah-koo-shur'. An obstetrician.
Am'nion. The inner embryonic membrane.
An'te-Part'um. Before delivery.
Ballottement, bal-lot'mong. A method of examination for pregnancy.
Caul. Fœtal membranes covering the head. The omentum.
Chorion, kō-re-on. Outer membrane enveloping the fœtus.
Colostrum, ko-los'trum. The first milk secreted after labor.
Congen'ital. Existing from birth.
Craniot'omy. The operation of breaking up the fœtal skull.
Decidua, dē-sid'ū-ah. Membranous envelope of ovum in the uterus.
Deliv'ery. Childbirth.
Fimbriæ, fim'bre-ē. Threads or filaments; a fringe.
Fœ'tus. The unborn child.
Fontanelle (Fr.) Membranous space at the junction of the cranial bones in an infant where ossification is incomplete.
Genita'lia. The organs of generation.
Gestation, jes-ta'tion. Another term for pregnancy.
In'cubator. An apparatus kept at a uniform temperature of 86° to 88°, devised for the rearing of premature children.
Intra-u'terine. Within the uterus.
Involu'tion. The process by which the uterus returns to its normal condition after pregnancy.

Lacera'tion. A tearing.

Lacta'tion. A term used to mean the period during which the child nurses.

Lanugo, lan-ū'gō. Downy hair on the new-born.

Liquor Amnii, lī'kwor am'ne-ī. Fluid surrounding the fœtus.

Lochia, lō'kē-ah. Vaginal discharge after labor.

Mam'mary. Pertaining to the breasts.

Masti'tis. Inflammation of the breast.

Meconium, mē'kō-ne-um. First fæcal discharge of the new-born.

Multip'ara. A woman who has borne several children.

Næ'vus. Birth-mark (generally due to the dilatation of blood-vessels). A mole.

Omen'tum. A fold of peritoneum covering the viscera.

Palpa'tion. Exploration with the hand (for diagnostic purposes).

Parturi'tion. The act of giving birth to young.

Phlegma'sia Do'lens. Œdema of the leg from venous obstruction; milk-leg.

Placen'ta Præ'via. Presentation of the placenta before the fœtus.

Presenta'tion. A term used to denote which part of the fœtus comes first to birth.

Primip'ara. A woman pregnant with, or who has borne only, her first child.

Puer'peral. Pertaining to child-bearing.

Quick'ening. First perceptible movements of the fœtus in utero.

Secundine, sek'un-din. The after-birth.

Subinvolu'tion. Imperfect involution.

Symphysiotomy, sim-fiz-ē-ot'ō-me. Section through the symphysis pubis.

Ver'nix Caseo'sa. The cheesy material which covers the fœtus.

Ver'sion. Turning of the fœtus in utero.

Vi'able. Capable of living.

URINARY ANALYSIS.

Acet′ic acid, $C_2H_4O_2$. Acid of vinegar.

Albuminu′ria. The presence of albumin in the urine.

Amorphous, a-morf′us. Formless. Non-crystallized.

Am′yloid. Starch-like.

Anal′ysis. The resolution of a body into its elements.

Anuria, an-ū′re-ah. Absence or deficiency in amount of urine.

Bil′iary. Pertaining to the bile.

Blood-casts. Abnormal microscopic bodies in urine, being moulds of urinary tubules made up of blood-cells.

Cal′culus. A stone-like concretion found in the body.

Cal′culus, Re′nal. Stone found in the kidney.

Cal′culus, Ves′ical. Stone found in the bladder.

Chyluria, kī-lū′re-ah. The passage of milk-like urine.

Cysti′tis. Inflammation of the bladder.

Cystot′omy. Incision into the bladder.

Diaphoret′ic. An agent which produces perspiration.

Diuresis, dī-ū-rē′sis. Excessive secretion of urine.

Diuret′ic. An agent which increases the flow of urine.

Drop′sy. The effusion of fluid into tissues or cavities of the body.

Dysuria, dis-ū′re-ah. Difficult or painful micturition.

Enuresis, en-ū-rē′sis. Incontinence of urine.

Filtra′tion. The process of straining or filtering.

Glomer′ulus. A knot or small tuft of vessels (particularly in the kidney).

Glycosuria, glī-kōs-ū′re-ah. The passage of sugar in the urine.

Grav′el. Sand-like deposit in the urine.

Hæmaturia, hem-at-ū′re-ah. The passage of blood in the urine.

Hippu′ric Acid. An acid normally found in small quantities in human urine, and in larger quantities in the urine of herbivorous animals.

Incon′tinence. Involuntary evacuation of the urine or fæces.

Lith'ic. Pertaining to stone.

Lithot'omy. Cutting into the bladder for stone.

Lithot'rity. Crushing a stone in the bladder.

Lit'mus. Blue pigment turned red by acid; or red pigment turned blue by alkalies.

Mea'tus. A passage or opening.

Meatus Urinarius. The opening into the urethra.

Metamor'phosis. Transformation; structural change.

Micturi'tion. The act of voiding urine.

Nephrec'tomy. The operation of cutting out the kidney.

Nephritis, nef-rī'tis. Inflammation of the kidneys.

Nephrot'omy. The operation of cutting into the kidney.

Opac'ity. Non-transparency.

Pig'ment. Organic coloring matter.

Pipette, pip-et'. A small glass tube for taking up fluids.

Polyuria, pol-ē-ū're-ah. Excessive secretion of urine.

Precip'itate. Anything changing from a soluble to an insoluble form in a solution.

Pyelitis, pī-el-ī'tis. Inflammation with formation of pus in the pelvis of the kidney.

Pyuria, pī-ū're-ah. The presence of pus in the urine.

Quan'titative. Pertaining to quantity.

Rea'gent. Anything producing a reaction.

Reten'tion. Holding back. The act of retaining urine in the bladder.

Saccharometer, sak-ar-om'et-er. An instrument by means of which the amount of sugar in a solution can be estimated.

Sed'iment. Matter which settles at the bottom of a liquid.

Specif'ic grav'ity. Weight of a substance compared with that of distilled water.

Strangury, stran'gū-re. Painful urination in drops.

Stric'ture. A contraction existing in a duct or tube.

Suppres'sion. Concealment; failure of the kidneys to secrete urine.

Transuda'tion. Oozing of a fluid through the pores of the skin.

Uræ'mia. Toxic condition of the blood, due to the non-excretion of effete substances (formerly supposed to be urea).

Urates. Salts of uric acid.

Urea, u-rē′ah. Chief solid constituent of urine; a nitrogenous product of tissue-decomposition.

Ur′eter. The tube which carries the urine from the kidney to the bladder.

U′ric ac′id. An acid normally found in small amounts in human urine.

Urinom′eter. Instrument for measuring the specific gravity of urine.

BACTERIOLOGY.

Aëro′bic. Living only in the presence of oxygen or air.

Amœ′ba. A colorless protoplasmic animal micro-organism.

Anaëro′bic. A term used of micro-organisms which are produced or which live in the absence of oxygen.

Aut′oclave. Instrument for sterilizing by means of steam heat under pressure.

Bacil′li (sing. **Bacillus**). The most important group of bacteria, so called from their resemblance to small rods.

Bacter′ia (singular, **Bacterium**). A general term for the lowest form of vegetable micro-organisms which multiply by fission.

Bacteriol′ogy. The science which treats of bacteria.

Conta′gium. Septic matter or germs of specific disease.

Cul′ture. A term loosely applied to the product of the propagation of germs in suitable fluids or other media.

Diplococcus, dip-lō-kok′us. Cocci united in pairs.

Fermenta′tion. The process of decomposition due to the action of living organisms or of an unorganized ferment.

Frac′tional Steriliza′tion. The process of sterilizing for a fixed time on more than one occasion.

Fis′sion. Reproduction by splitting into two or more equal parts.

Fomites, fō′mitēz. Substances capable of absorbing contagious matter.

Germ. The special virus or spore by which a disease becomes communicable.

Ger′micide. An agent which destroys germs.

Immu′nity. Freedom from risk of infection.

Incuba′tion. The period which intervenes between the implantation of the virus and the appearance of the disease.

Infec′tion. The process of communicating the germs which produce a disease.

Infec′tious. Capable of infecting.

Inocula′tion. The act of introducing a specific virus into the system.

Macroscop′ical. Visible to the naked eye.

Me′dium. That in which anything lives.

Mi′crobe. A micro-organism.

Micrococ′cus. A spherical bacterium.

Microscopical. Not visible to the naked eye, but only through the microscope.

Nu′clear. Pertaining to the nucleus.

Pasteuriza′tion. The name given to a special kind of treatment of a substance, *e. g.*, milk, with a view to the destruction of microbic life in it, and thus preventing decomposition.

Pathogen′ic. Having the property or power to cause disease.

Phagocyte, fag′ō-sīt. A cell possessing the property of absorbing and digesting bacteria.

Phagocyto′sis. Destruction of microbes by the action of phagocytes.

Putrefac′tion. Organic decomposition.

Saprogenic, sap-rō-gen′ik. Pus-forming.

Spiril′lum. A genus of bacteria.

Sporad′ic. Scattered; occurring in isolated cases.

Spore. The form of reproductive body in cryptogams analogous to the seed.

Staphylococ′ci (sing. *-us*). A class of microbes.

Streptococ′ci (sing. *-us*). Bacteria arranged in strings.

Ther′mostat. Any automatic device for regulating temperature.

Vi′rus. A poison which causes a morbid process or disease; any pathogenic microbe

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